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Volume 20, No. 2

February 2001

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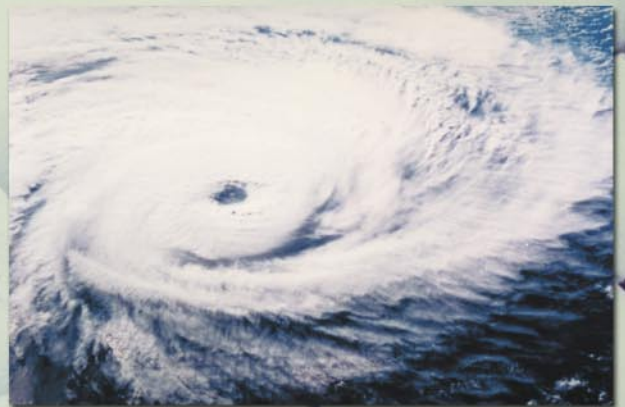
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Monitoring Times

*Eyes and
Ears on
the Weather*



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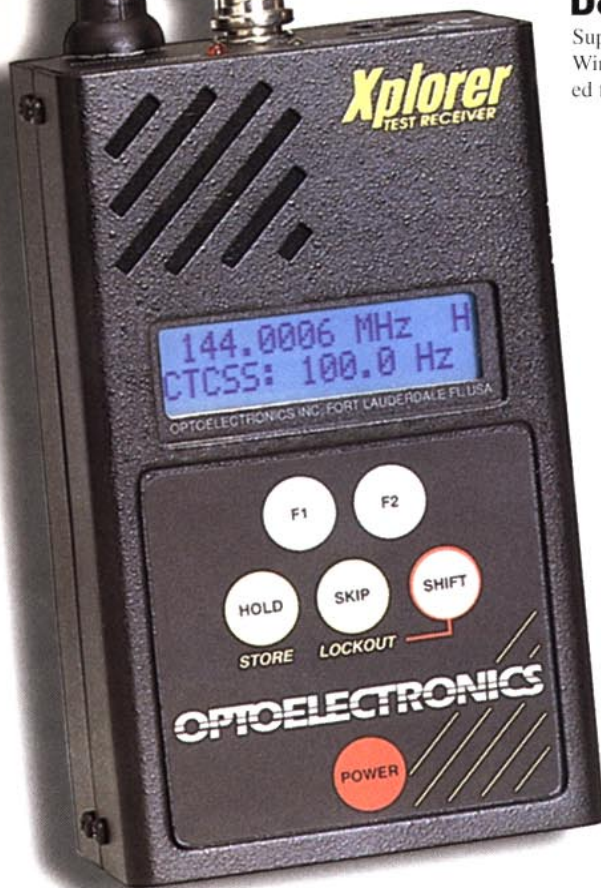
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Monitoring Times

Vol. 20, No. 2

February 2001



Cover Story

Eyes and Ears on the Weather

Whether it's a blizzard or a summer tornado, advance warning of approaching danger can make a major difference in fatalities or injuries to the public. Radio has always played a major role in disseminating information, and thanks to the National Weather Service, people on the go are never far from a source for weather information.

The National Weather Service has made great strides in establishing a network of local transmitters which now form an all-hazards network. But radio broadcasts aren't the only way of acquiring the information. See *The Fed Files* column on page 64 for more on the NWS and a full table of EMWIN data stream broadcast areas.

Weather facsimile transmissions from the U.S. Air Force have now been found on several frequencies, as reported in the *Utility World* column on page 32. Of course, you could also acquire the weather map directly from the satellites as in *View from Above* on page 63.

Canada has its own network of weather radio stations, and you can find the entire list in *Service Search* on page 30.

International ALE Networks 10

By Mike Chace

HF communications have received a real boost since the advent of automatic link establishment (ALE) systems, but their digital nature kept hobbyists shut out until Charles Brain made PC-ALE software freely available. In this feature article *MT* reveals some of the international nets identified as diplomatic, military, and business nets, as well as many unidentified users. Come join the intrigue!

Inside the Lower Colorado River Authority 14

By John Mayson

A huge state agency that covers all of central Texas, LCRA replaced its low band communications system with one of the biggest trunked systems in the U.S. However, programming your scanner for a 900 MHz EDACS system can be a little tricky, so here are tips and frequencies to get you started tuning in to this major system.

StarBand vs. DirecPC 18

By Ken Reitz KS4ZR

High speed internet access via satellite is no longer just a pipe dream or a rich man's toy: It has trickled down to the common man ogling the goodies at Radio Shack. In fact, two companies have announced two-way internet access via satellite: DirecPC and Starband. Here's a quick comparison between the two as well as the pros and cons of signing up.

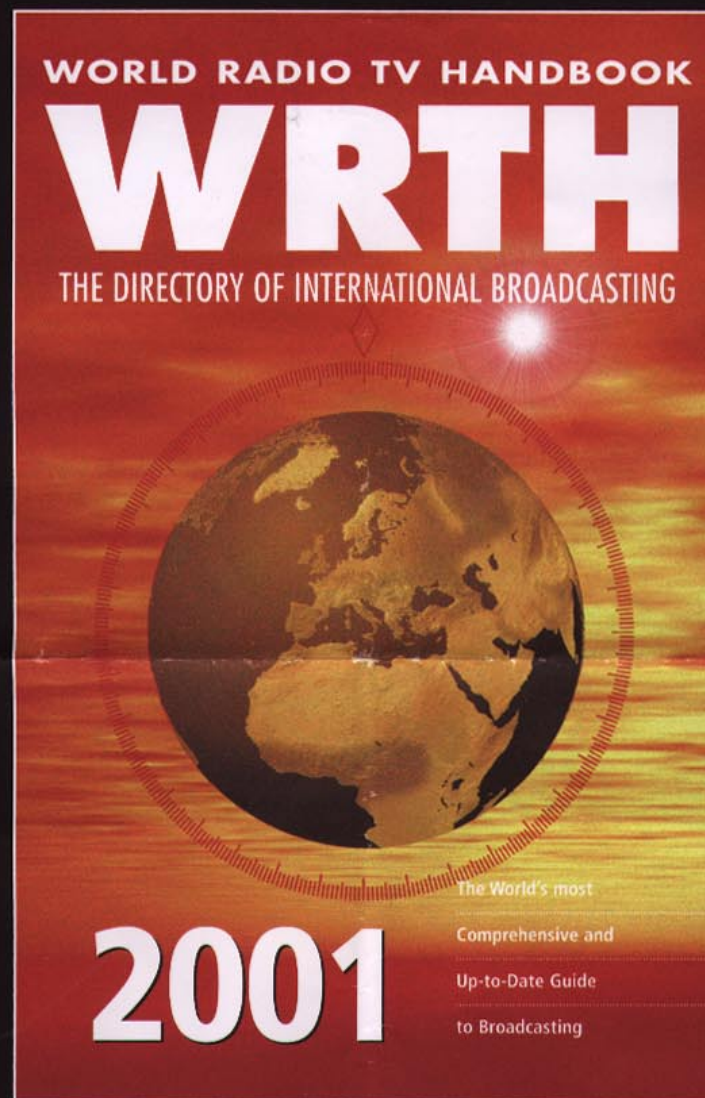
WWBS: The Little Station that Could 22

By Hans Johnson

What do you plan to do in your retirement? Charles Josey decided to erect a shortwave broadcast station in Macon, Georgia. All went well until the first signals went on the air ...

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Reviews:

Today's sophisticated wide cov-
erage receivers are like two receiv-
ers in one, and our reviews often
treat them that way. In this issue we
introduce the shortwave portion of
the AOR AR8600 mobile commu-
nications receiver (p.82). Many air-
ground communications are now
enacted via the digital ACARS sys-
tem, but the little, stand-alone, hand-
held ARD-2 from AOR can decode
and display the text with no radio or
computer necessary (p.80).

Computer programming your
scanner is convenient and some-
times a necessity. So far there is only
one software program for the Yaesu
VR-500 – the VR-500 Programmer
from RT Systems (p.84).

NTSC, PAL, SECAM ... These in-
compatible video formats can be ag-
gravating for anyone wanting to watch
international satellite transmissions,
but the Emerson Universal Multi-Sys-
tem Video Converter removes all ob-
stacles to viewing (p.87).

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Reconsideration Urged on MURS!

"...the FCC's decision as constructed will alter the fundamental purpose of these frequencies in a manner detrimental to business and industrial users that was not contemplated...." From Motorola Petition for Reconsideration

As Part of the FCC's 1998 Biennial Regulatory Review, on October 13, 2000, the FCC reallocated five low power VHF frequencies from the Part 90 Private Land Mobile Radio (PLMR, business band) to a newly-created Part 95 general use Multi-Use Radio Service (MURS.)

Instead of business-related communications, these frequencies (154.570, 154.600, 151.820, 151.880 and 151.940 MHz) may be used for any personal or business purpose. It is somewhat similar to the UHF (462-468 MHz) Family Radio Service (FRS) which has 14 channels in the 70-cm band. FRS' maximum power level is only one-half watt. MURS four times more powerful.

MURS offers certain capabilities not readily available from any other unlicensed personal and family communications service. For instance, vehicle-to-vehicle range, even with a 2 Watt ERP limitation, will be substantially better with MURS than with FRS, especially because it is permissible to use external vehicle antennas.

The key selling points of MURS is the higher power, increased range, and interference over FRS. Its key drawback is that it has only five channels, but the FCC said it would consider adding more channels if the service proved popular. The new service could be useful for unlicensed individuals wishing to work in conjunction with radio amateurs performing public service communications.

Many manufacturers are concerned that MURS will have an adverse impact on the sale of FRS radios of which Motorola is a major player. Kenwood expects the service to "take off" once manufacturers come out with some small, compact, low priced units, just like FRS. Retail prices should be in the \$100 bracket.

Reconsideration requested

Several parties filed Petitions for Reconsideration within the 30-day period allowed for such petitions. Two of particular importance were those filed by Motorola, Inc., and

the Personal Radio Steering Group Inc. (PRSG).

In its request for reconsideration, Motorola said that while it generally supports the elimination of licensing requirements for the five low power frequencies, it opposes the use of these channels for anything but industrial and business use.

In its formal comments to the Notice of Proposed Rulemaking, Motorola recommended that the frequencies be placed in a new unlicensed radio service category, called the "Low Power Industrial/Business Radio Service" that "will be designated for business users only and clearly distinguishes itself from the Family Radio Service and Low Power Radio Service frequencies in the Citizens Band Radio Service."

Motorola is also concerned that "The expanded availability of the frequencies to general consumers will increase traffic congestion and interference, thereby harming business users."

Motorola also points out that the Part 90 (business band) rules prohibits interconnection (phone patching) to the Public Switched Telephone Network (PSTN) without appropriate licensing. There is no such restriction for MURS "...which could lead to new and unintentional uses of the channels, to the detriment of existing users."

For example, Motorola anticipates the development of a two-watt cordless telephone that provides service – and interference – for miles from its intended base. There are no MURS restrictions on the use of external antennas nor on antenna height.

The Motorola Petition requests that the FCC set aside these new rules altogether, and return these frequencies to the Business Radio Service. It wants a prohibition on telephone interconnection and to preclude a dual-band 2 meter/70 cm CB (MURS/FRS) handheld radio from being marketed.

If the FCC were to take the action requested by Motorola (and we expect further intensive lobbying pressure from Motorola), MURS would simply be canceled, obliterated, gone.

Personal Radio Steering Group

The Personal Radio Steering Group, Inc. is an all-volunteer, not-for-profit Michigan corporation established by GMRS licensees.

Although it supports MURS, PRSG takes issue with some of its specifications and also filed a Petition for Reconsideration.

In the PRSG Petition, coordinator Corwin D. Moore, Jr. WB8UPM (Ann Arbor, Michigan) requests certain additional rule changes that would help retain much of the current nature of use of these frequencies.

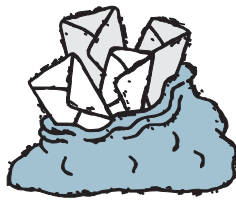
Their position is that "it is the nature of the usage of these frequencies, not the nature of the users," that is the critical factor in this reconsideration. "Besides, these frequencies already have personal users on them," Moore said.

PRSG points out that the FCC did not suggest any changes in transmitter power or connection to the public telephone system. The Order "...adopts a transmitter power limit based solely on ERP (effective radiated power)."

"This is a concept that is difficult for the typical citizen to understand or calculate, and is nearly impossible to measure directly," Moore said. "Because of this confusion and imprecision, the operator of a MURS station could reasonably question if it is permissible to use a radio with a transmitter rated at four-watts of output power" since the ERP would be less than 2 watts. Furthermore, connection to a high gain antenna would greatly exceed the 2-watt ERP limit making even a 2-watt radio illegal to use. For this reason, PRSG wants the FCC to replace the 2-watt ERP limitation with a maximum transmitter output power of 2 watts.

PRSG also wants the rules to be reconfigured to fulfill mobile communications needs as formerly authorized under Part 90 rules. The new rules might expand recreational use of base-station-to-base-station use. The rules should also limit antenna height, prohibit "repeater-like functions" and phone patching. PRSG also suggests that MURS be renamed to the "Mobile Use Radio Service."

"If the FCC were adopt our more modest changes (but leave the MURS service otherwise intact), personal use of these MURS frequencies will continue to increase. Our requested changes go more to technical issues that would not cause any significant disruption to plans for this new service, but that would retain its current mobile-use orientation," PRSG said.



LETTERS TO THE EDITOR

Tooling Down I-35

"Just finished reading *Monitoring Times* #12. I love your publication and when I read your article about scanning Interstate 35, I loved all the great tips. I remember many times seeing a police vehicle zip along and was unable to determine if it was a city cop, sheriff or highway patrol. I related to your article perfectly.

"Being a former US Army Criminal Investigation Division narcotics agent, I wonder how many people were monitoring my broadcasts during various raids we used to do in Germany? What a strange world we live in, you never know who might be listening."

— Paul Dale Roberts, Elk Grove, CA

John Mayson, the author of that article, sent the following reply to Robert Brock, who had asked why he didn't include information about the Texas Rangers.

"I'm glad you read my article about scanning I-35 in Texas. I did not include information about the Texas Rangers because I was focusing primarily on regular patrol-type law enforcement. However I am happy to provide you with what I know about the Texas Rangers.

"The Texas Rangers are a branch of the Texas Department of Public Safety (DPS). Senior Captain Bruce Casteel leads this elite police force.

"Competition to become a Ranger is tough. According to DPS you must live in Texas. You must complete 60 college credit hours. Most Rangers have degrees; some have advanced degrees and certifications. You must have a record of eight years of outstanding full-time law enforcement experience, two of which must be with the Texas DPS at a certain rank, and military law enforcement service does not count. You must pass stringent written and oral exams and you must be physically fit. If you meet all of this criteria all it gets you is a spot on the 'qualified to apply' list.

"Given the fact that there are only 107 Rangers, competition is fierce. There are usually 40 to 100+ applicants for every position.

"What do the Rangers do? Under state law, Texas Rangers are charged with four duties:

- (1) protect the life and property of Texans by enforcing the criminal statutes;
- (2) suppress riots and insurrections;

- (3) investigate major crimes; and
- (4) apprehend fugitives from justice.

"Of these, #1 and #3 occupy most of their time. Writers have called them a 'state FBI' or an 'elite investigative unit' and have compared them with Scotland Yard, Interpol, the investigative arm of the Royal Canadian Mounted Police, the French Surete and the FBI. Their powers are specified under state law as similar to county sheriffs with the exception that they have no state jurisdictional boundaries.

"I find this an interesting note: Chuck Norris is today's most famous fictional Ranger. While he is a sworn volunteer law enforcement officer for a city east of Dallas, the Texas Ranger's dress code prohibits beards, one of Chuck's defining physical characteristics.

"The Texas Rangers, when they use radios, simply use DPS frequencies. 155.505 MHz and 159.090 MHz are assigned exclusively to the Rangers. They can be found on 155.475 MHz, which is used mostly in narcotics enforcement. They are also assigned splinter frequencies of 159.0975 and 155.5125 MHz. However, I don't know of anyone who has ever monitored traffic on these frequencies. Since few Rangers perform patrol duties and spend much of their investigating crime scenes, they rely mostly on cellular phones and pagers.

"I hope I have answered your questions and we thank you for being a *Monitoring Times* reader."

— John Mayson

John also supplied the following web sites for folks interested in learning more about the Texas Rangers.

<http://www.texasrangers.org>

<http://www.texasranger.org> (singular)

<http://www.txdps.state.tx.us>

Corrections and Additions

"Philip Gebhardt's 'Attenuators Tame Your Outdoor Antenna' (Project Pages, December 2000) contained an incorrect equation. The proper equation for calculating R1 and R3 is $50(F+1)$ [numerator] over $F-1$ [denominator], which is actually much easier to calculate than the equation given. And while the equation for calculating R2 will work, a much simpler equation (which doesn't require knowing R1 or R3 in advance) will yield the same result: $25(F-1)(F+1)$ [numerator] over F [denominator]. These equations will provide the same val-

ues listed in Table 1.

—Allen Lutins

(Or you could just send in your \$7 to George Murphy VE3ERP and get your copy of Hamcalc and let a computer program run your math — See "What's New," p.87 — ed.)

"Leon Fletcher's article about San Francisco's radio heritage (*MT*, December 2000) erroneously states that New Mexico and Arizona were admitted to the Union in 1909. The correct year for these admissions was 1912. According to *The World Almanac*, New Mexico became a state on January 6, 1912, followed by Arizona on February 14, 1912."

— Perry Crabill, W3HQX

Living with a Heavy Radio

"Over the years, I've had a couple of suitcase-sized AM/FM/shortwave portables — a Zenith Transoceanic and a monstrous National Panasonic that could best be described as a boat anchor with a handle. The latter, especially, was a big hernia machine.

"The older I got, the less inclined I was to lug the big sets around, trying for a comfortable place to listen without incurring my wife's annoyance about 'cluttering up the living room.'

"When I got a Grundig Satellit 800, the computer age was well upon us, and I sought an answer to the old problem in an office-supply store.

"There I found an inexpensive com-





puter-printer stand that looks enough like furniture so as not to bother my wife. It has wheels, so it's easy to move from couch to a chair as desired, or to get out of the way during vacuum-cleaning. While the radio sits on top in place of the printer, the shelves that were designed to hold printer

paper serve well for storing *Monitoring Times*, earphones, stereo speakers, power supplies and other paraphernalia.

"My wife is a lot happier with the appearance of the living room, and I have to lift the radio a lot less often than before. All you've got to do is remember to disconnect any external antennas or power cords before pushing the printer stand around."

— Robert Compton, Mertztown, PA

Many thanks for your letters. Send your kudos, comments, and corrections to *Letters to the Editor*, PO Box 98, Brasstown, NC 28902 or email mteditor@grove-ent.com and let us hear about your great monitoring times.

— Rachel Baughn, editor

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Oscar AO-40/Phase III-D Cliff-Hanger

After a successful launch (see last month), AMSAT OSCAR-40's 2-meter beacon went silent on December 13th while work on the propulsion system was in progress. Ground controllers had adjusted the satellite's orbit earlier that week, but as a result of fuel-valve problems, AO-40 ended up in a higher-than-planned orbit.

It had been hoped that an onboard computer timeout expected about December 16 would restart the beacon telemetry and give the ground crew some clues as to why AO-40 suddenly stopped transmitting, but for days nothing was heard on the 2-meter downlink frequency of 145.898 MHz.

NORAD confirmed the satellite was in one piece and the orbit was where it should be. Ground controllers sent the satellite "blind commands" and planned other "command-assist" routines to cycle the satellite through various receive, transmit, high-gain and low-gain antenna modes, hoping to avoid a hard reboot of the main computer.

On Christmas day, the amateur community received the excellent news that contact had been made with AO-40 through the L-band uplink and S-band downlink. "While we all realize that this is just the first step in many, without making this initial 2-way contact with AO-40, recovery would not be possible," said AMSAT-NA President Robin Haighton.

Congress Usurps FCC

In a last-minute ruling slipped into the budget bill, Congress put a ban on removing the cushions that protect FM channels, effectively killing the Low Power FM service initiated by the FCC. The FCC was allowed to license 9 stations in small markets to test the service, after which Congress itself will set the regulations and license the stations!

In the same bill, Congress also overturned regulations (already suspended by a federal court), which required broadcasters to give free air time to candidates to respond to personal attacks or political endorsements.

Supreme Court to Rule on Cellphone Taping

During a labor dispute in Wyoming a union negotiator using a cellular phone appeared to threaten a bombing attack on school board members. Someone recorded the conversation and placed the tape into the mailbox of a local radio talk show host who was opposed to the union position. That announcer gave the tape to another host who played the entire conversation on his show which was aired by WILK and WGBI in September 1993.

The two persons whose conversation was taped sued both talk show hosts and the radio

stations under state and federal laws for having used and disclosed the tape of their intercepted phone conversation.

In November 2000 the Supreme Court justices heard arguments on the constitutionality of state and federal wiretap laws which held these parties liable for airing the conversation. Their finding could define limits on telephone privacy and determine when news organizations may broadcast or print private phone conversations. Current laws prohibit disclosing contents of telephone calls that are illegally intercepted.

Justice Anthony Kennedy said there is "simply no precedent in the history of this court" for isolating certain types of speech, regardless of its content, and subjecting it to regulation. He said the laws restricting the use of wiretapped conversations have the effect of "suppressing speech that is valuable to the public."

Justice Stephen Breyer retorted that those laws preserve the privacy and dignity of individuals. And Justice Antonin Scalia said knowing that his private conversations could be published "inhibits my speech."

A ruling is expected later this year.

Local Enforcement of Citizens Band

HR2346 was passed by the 106th Congress and signed into law by President Clinton in late November. The law allows state and local governments to pass and to enforce regulations that prohibit unauthorized CD radio equipment. Stations licensed to the amateur radio service will remain under FCC oversight. A person affected by a local regulation may submit an appeal of the decision to the FCC.

NPR on Shortwave

NPR Worldwide, which transmits signature NPR programs to overseas audiences via FM radio rebroadcast, cable and satellite, has added shortwave transmissions and an international ad campaign to extend its global reach and visibility. The shortwave broadcasts deliver noted programs such as *Morning Edition with Bob Edwards* and *All Things Considered*.

Listeners with single side band shortwave receivers can pick up *NPR Worldwide* via the Armed Forces Radio and Television Service's global broadcasts. *Car Talk*, *Weekend Edition Saturday*, *Weekend Edition Sunday* and *Weekend All Things Considered* are included on shortwave. For a shortwave programming schedule and tune-in information, visit <http://www.npr.org/worldwide/shortwave.html> or call 1 202 513 2026.

DoD Contracts with Iridium

DoD awarded a two-year, \$72 million contract to Iridium Satellite LLC for unlim-

ited use of its global, satellite-based, secure telephone network. Iridium Satellite will contract with the Boeing Co. to operate and maintain the system's 73 satellites.

According to Dave Oliver, principal deputy undersecretary of defense for acquisition, technology and logistics, "Iridium will not only add to our existing capability, it will provide a commercial alternative to our purely military systems." The system offers mobile, cryptographically secure telephone services to small handsets anywhere in the world, North Pole to South Pole, 24 hours a day, officials said.

DoD used some 800 of the first-generation phones when the system was inaugurated in 1998. Connect time on that system was as much as \$5 per minute to some customers. Iridium Satellite LLC recently bought the bankrupt company's assets and expects to provide commercial service for about 80 cents a minute, Oliver said, while the Pentagon will pay 10 to 30 cents a minute. Advances in technology have also led to an improved handset by Motorola since the bulky first model. It is about twice the size of a typical cell phone and has a call-reliability rate of 95 percent, with a special encryption sleeve to ensure secure communications.

The U.S. military will use its Enhanced Mobile Satellite Services Gateway system at Wahiawa, Hawaii, to provide DoD Iridium users with direct-dial connection to the Defense Information Services Network and to public-switched telephone networks.

The Navy Hands it to the Palm

For the hundreds of sailors aboard the Navy's *U.S.S. McFaul*, queuing up to access a computer was part of the daily drill until



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LIMARC Winterfest 2001 Electronic Hamfair and Flea Market, located Levittown Hall, 201 Levittown Parkway, talk-in 146.850 (PL 136.5), 8 a.m., \$6 gen adm. For more info visit <http://www.limarc.org> or call 516-520-9311.

Feb 10 deadline: CIDX SW Listener Survey

The Canadian International DX Club announces its 3rd Annual CIDX Shortwave Listener Survey, honoring excellence in ten categories of international shortwave broadcasting. All shortwave listeners, worldwide, are invited to submit their top picks. For instructions, please visit the CIDX website at <http://www.anarc.org/cidx/>. All participants will have their names entered in a draw for a one-year membership in the Canadian International DX Club. Winners in each category will be presented with the annual Fessenden Awards.

more than a hundred Palm V handheld devices were issued this past summer. The 115 handhelds, along with the installation of infrared ports throughout the ship, are part of a pilot program to keep officers and supervisors connected and eliminate paper-based forms, sticky notes, and reports.

Earlier this year, the Navy deployed 2,000 Palm V handhelds to its Atlantic fleet. But the *McFaul* alone gets to test the feasibility of using infrared ports, because its crew is young and receptive to the technology. Sailors are able to send and receive email and coordinate schedules and checklists by syncing their device with one of the infrared ports located in work centers and high-traffic areas.

Sailors use the "beam" feature to send each other short messages, improving communication. A petty officer can send a message to three or four crew members about a task at hand, whereas in the past, the officer had to contact each one individually. The syncing of handhelds to infrared ports enables shipmates to share information on the fly, whether it's about a meeting or maintenance needs. And the only time sailors have to park their Palms in a cradle is to recharge them. That eliminates the need to wait in line at the workstation.

Police Off-Limits in U.K.

It's not nice to listen to the police in the U.K. When police raided the home of a York man last December in connection with an allegation that he had handled a stolen radio controlled model car, they found a scanner tuned to their own frequencies. The suspect pleaded guilty to using radio equipment without authority with intent to intercept police radio conversations. He was fined £250 with £50 costs and the charge of handling stolen goods was dropped.

Al Gross Dies

Al Gross, W8PAL, of Sun City, Arizona, passed away on December 21 at the age of 82.

Gross obtained his Amateur Radio license in 1934 at the age of 16, which helped shape the course of his career. Gross' first invention was a portable hand-held radio transmitter-receiver which he christened it the "walkie-talkie." During World War II he invented a two-way air-to-ground communications system used by the military behind enemy lines during the World War II.

"If you have a cordless telephone or a cellular telephone or a walkie talkie or beeper, you've got one of my patents," Gross once said. The Dick Tracy two-way wrist radio was based on Gross' concept of a miniaturized two-way radio.

Over the years, Gross worked as a communications specialist for several large companies. Since 1990, he had worked as a senior engineer for Orbital Sciences Corporation and was still on the payroll there when he died.

Gross received numerous awards and honors during his distinguished career; just this year he won the Lemelson-MIT Lifetime Achievement Award for invention and innovation and for playing a major role in the wireless personal communications field. *Monitoring Times* ran a series of stories on his life and achievements in September 1997.

Joe Carr Dies

Author Joseph J. "Joe" Carr, K4IPV, of Annandale, Virginia, died November 25 at the age of 57. Carr reportedly died at home in his sleep.

Carr was well known throughout the radio hobby as a prolific writer. Carr had contributed hundreds of articles over the years to various publications, including *Monitoring Times*, *QST*, *Popular Communications*, *Popular Electronics*, *73*, *Nuts and Volts* and others. At the time of his death, Carr was the "Antennas & Things" columnist for *Popular Communications*. He had written more than 100 books, including *Joe Carr's Loop Antenna Handbook*, *Practical Antenna Handbook*, *Receiving Antenna Handbook*, *Radioscience Observing, Vol 1*, and *Practical Radio Frequency Test & Measurement - A Technician's Handbook*.

Book publisher and author Harry Helms, AK6C, told the ARRL, "It's a shame most hams only knew him from his technical books and articles, for Joe's interests ranged from American history to world politics to genealogy to biomedical research," he said. "We had innumerable lengthy conversations over the years about such topics, all laced with Joe's sharp but good-natured humor."

Our sympathies are extended to Carr's wife, Bonnie.

"Communications" is compiled by Rachel Baughn, editor, from news reports submitted by our readers. Thanks to this month's reporters: Anonymous, Albany, NY; Doug Robertson, Oxnard, CA; Bob Stewart, Ft Worth, TX. Via e-mail: Wes Albright, Andy Cadier via Glenn Hauser, Robert Felton, John Figliozi, Tom Hirsch, T. Martin, Hugh Stegman, Larry Van Horn, Robert Wyman, Surrey Electronics, and the ARRL Bulletin.

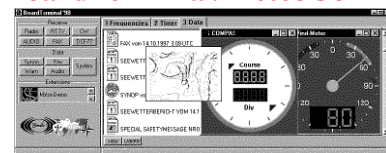
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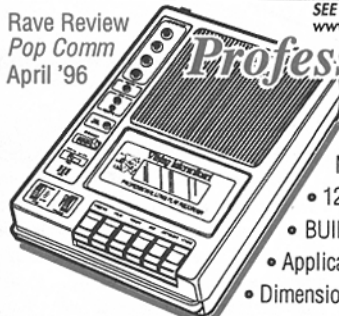
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International ALE Networks

By Mike Chace

Monitoring Times always likes to maintain leadership in bringing you the latest news and understanding of developments in our hobby. About a year ago, Charles Brain's incredible (and free!) PC-ALE program added a vital new component to the HF listener's arsenal – the capability to scan and monitor HF networks using the MIL-STD-188-141A Automatic Link Establishment (ALE) system. We covered it extensively then and since, and continue to enlarge our comprehensive coverage in this feature.

PC-ALE caused an explosion in a monitoring world struggling to keep up with the pace of developments in digital communications and HF modem technology. Many of the organizations covered by *MT*'s *Digital Digest*, *Fed Files* and *Utility World* columns had migrated to new equipment beyond the decoding capability of even top-end hobbyist equipment. But, armed with a simple PC containing a standard soundcard and a copy of PC-ALE, these stations were now "back on the radar screen."

To boot, PC-ALE threw up dozens more new networks for monitors to track down and identify. In this feature, we cover those networks, both identified and unidentified in the hope that more information can come to light. In case you were wondering, US domestic and military ALE networks were extensively covered in a June 2000 feature article in *MT*, and won't be repeated here, even though many of these networks do, of course, have international coverage.

MIL-STD-188-141A ALE Redux

Despite the complicated designation and multiple capabilities of ALE, it's really quite a simple digital system consisting of 8 tones with a speed of 125bd, occupying a bandwidth of 1650Hz. The sound it makes is quite simply unmistakable (see Resources) and is mostly described as a rough "gurgling."

Just like SITOR-A's SELCALs, and AX.25 Packet Radio or PacTOR's addresses, stations in an ALE network respond to identifiers consisting of combinations of letters or numbers like "CRO," "CENTRA4" or "000055555," for example. With the addition of "wildcard" identifiers, ALE can be used to address individual stations, groups of stations, or the whole network. As the examples suggest, identifiers can be either cryptic or meaningful, but generally they require some investigation to reveal the real owners of the signals. The database at Utility Monitoring Central (see Resources) now has well over 1,000 ALE unique identifiers recorded, about 20% of which have been positively identified.

In addition to the basic function of establishing communications between one or more stations, ALE is also used to regularly determine the availability and

quality of a link (or multiple links) between those stations (called Sounding and LQA - Link Quality Analysis). There are also a number of ways that networking commands and short operator messages can be passed between stations. PC-ALE can decode all these various modes.

Most organizations carry their ALE on the upper sideband (USB), but a few prefer LSB. Some also implement a special mode of ALE called LP (Link Protection), which renders the transmissions undecodeable. Also, be aware that many ALE users have developed bad habits: for example, not changing their equipment's preset default identifiers and frequencies. There are numerous examples where entirely different networks operate on the same frequencies!

Diplomatic ALE Networks

Sweden

All Swedish Embassies are linked, through regional hubs, to MFA Stockholm with ALE and can be heard the world over. Actual messages are passed using a 2400bd MIL-188-110A PSK modem. Regional hubs frequently sound the links to their neighbors and to Stockholm on their assigned pool of channels.

Frequencies:

6980	7972	9070	9970	10150	10581
10587	11045	11157	11443	12225	12226
14350.5	14353.5	14404	14522	14812.5	15860
16105	16181	17415	17427	18686	18945
19423.5	20698	20942	20958	20985	22928.5
23526	23584	23591	26221		

Identifiers:

S00 MFA Stockholm
S00-99 Embassies

Romania

MFA Bucharest is linked to a number of its strategic embassies using ALE. The embassies mostly use tactical callsigns, many of which have been carried over from the old RTTY and ROU-FEC systems but few have been positively identified. Actual messages are carried on a modified 2400bd STANAG4285-type PSK modem.

Frequencies:

6689	6817	6863	7973	8025	8034	8050
9321	9322	10450	11425	13425	13468	13485
14406	16051	16321	17474	18503	20533	20550

Identifiers:

CENTR1, 2, 3, 4, 5	MFA Bucharest
BLJ	Embassy Tel Aviv, Israel
CAM	Embassy Budapest, Hungary
FOL	Embassy Cairo, Egypt
GUB	
HOL	
KNY25	Embassy Washington DC, USA
PHG	Embassy Berne, Switzerland
ONN33	Embassy Brussels, Belgium
YPM21	Embassy Stockholm, Sweden
YPM23	
YPM31	
YPM37	Embassy Warsaw, Poland
ZJC	
ZMF	
ZPO	
ZOW	
ZUP	Embassy Prague, Czech Republic
ZWP	
ZYP	

China

MFA Beijing is also connected to many embassies via HF ALE, traffic being carried on 2400bd MIL-188-110A-type PSK modems. Tactical callsigns are again used by embassies which makes identification difficult. A number of monitors have reported extensive operator chatter in USB voice before and after transfers.

Frequencies:

7885	9050	11105	14560
------	------	-------	-------

Identifiers:

115	
116	
118	
124	
161	
162	
166	
176	
YT315A	
YT316A	Possible Regional MFA Relay
YT362A	
ZT201A	Embassy Moscow, CIS?

Algeria

A number of Algeria's strategic embassies are now using the Racal MSM-1250 10-channel VFT modem which also performs set-up and link control with ALE. Identifiers are the abbreviated place names previously used on the old Coquelet-8 network.

Frequencies:

5784	10995	11475	14422	16080
16340	18758	19945	20340	

Identifiers:

MAE	MFA Algiers
ANK	Embassy Ankara, Turkey
ATH	Embassy Athens, Greece
BKO	Embassy Bamako, Mali
GAO	Embassy Garoua, Cameroon
NKT	Embassy Nouakchott, Mauritania
NMY	Embassy Naimey, Niger
RBT	Embassy Rabat, Morocco
TLV	Embassy Tel Aviv, Israel
TNS	Embassy Tunis, Tunisia
TRN	Embassy Tirana, Albania
TRP	Embassy Tripoli, Libya

Military ALE Networks

Austria

The Austrians have a contingent of peacekeeping troops in many UN-controlled zones throughout the world. ALE is used to trigger digital voice modems (vocoders), 2400bd MIL-188-110a PSK modems and other equipment.

Frequencies:

8021	10238	10259	10275	10875	14611
14675	19340	20320	20890		

Identifiers:

AFD	Earthquake Disaster Relief Unit, Turkey
AFDRU	Earthquake Disaster Relief Unit, Turkey
AFT	Earthquake Disaster Relief Unit, Turkey
AFTRU	Earthquake Disaster Relief Unit, Turkey
ATCON	UN Contingent, Kosovo
ATH	Peacekeeping Contingent, Shkodra, Albania
ATHUM	Peacekeeping Contingent, Shkodra, Albania
AUSCON	UN Contingent, Nicosia, Cyprus
AUSBATT	UN Contingent, Golan Heights, Syria
AUSLOG	UN Contingent, Bosnia
BMLV1	Austrian Ministry of Defence, Vienna
BMLV2	Austrian Ministry of Defence, Vienna
NET1	Collective Call
NET2	Collective Call

Canada

A number of frequencies carry Canadian Military traffic, probably combined with other units such as the Coast Guard. ALE has been heard triggering USB voice, 300bd/850Hz KG84 encrypted RTTY and MIL-188-110A PSK modems. Three distinct networks appear to operate on each frequency, but do occasionally exchange messages with one another.

Frequencies:

4453	6980	7896	8050	8859	9232
10396	10156	10558	11163	11402	12185
12200					

Identifiers:

Network 1:	12D, 12D1, 22D, 21S
Network 2:	CGE, CLC, CLC32, CLC44, CLC51, CLM, CLM21, CLM41, CLM46, CLM52, CRC, CRC1, CRC2, CRC3, CRM, CRM2, CRM4
Network 3:	123, CIP, CIP30, CIP38, CIP46, CIP302, CIS, CIS201, VDD, VEX

Colombia

The bases, ships and submarines of the Colombian Navy can be heard

on a variety of frequencies. ALE triggers Clover-2000 and MIL-188-110A PSK modems, an ANDVT vocoder and also plenty of USB voice chatter in both Spanish and English.

Frequencies:

4632	5500	7900	8300	8400	9085
9200	10486	10608	11155	11440	11455
13530	14582				

Identifiers:

ATLANTICO	Atlantic Fleet HQ
BARRANCA	Barrancabermeja Squadron Base
BRIM1	1st (Atlantic) Naval Infantry Brigade
BRIM9	Naval Infantry Brigade?
CAL	Corvette CM52 "Caldas"
CALDAS3	Corvette CM52 "Caldas"
CESPV	Special Command, San Andres & Providencia Islands
COVENAS	Covenas Air Base
CTG	Cartagena Coast Guard Base
CTGENA	Cartagena Coast Guard Base
ENS	Naval Academy, Barranquilla
ENSB	Naval Academy, Barranquilla
ESPARTANA	Coast Guard Vessel "Espartana"
FSUBFA	Submarine Flotilla HQ
GLORIA	Sail Training Vessel "Gloria"
INI	Inirida Port
LEG	Leguizamo Naval Base
MAL	Malaga Naval Base
MARQUEZ	Coast Guard Vessel PM117 "Jorge Marquez"
PIJAO	Submarine SS-28 "Pijao"
QUINDIO	Survey Vessel B0153 "Quindio"
TUMACO	Coast Guard Base, Tumaco
TURBO	Coast Guard Base, Turbo

Denmark

The Royal Danish Air Force and its NATO contingents use ALE to establish communications. ALE usually triggers a MIL-188-110A PSK modem.

Frequencies:

2250	4841	5120	11130	1146812186
13435	15820	16280		

Identifiers:

OWC	
OWD	Vaerloese
OWE	Karup RCC
OWF	
OWG	Grazzanise, Italy
OWI	
OWK	
OWP	
OWU	
OWW	

Romania

Romanian Forces can also be heard using ALE and MIL-188-110A-type PSK modems.

Frequencies:

13485

Identifiers:

R01
R02
R03
R04

Venezuela

A number of stations use ALE identifiers based on locations in the Venezuela interior and at the junctions

of major rivers, suggesting a Naval or Coast Guard operation.

Frequencies:

7810	11625	13475	15600
------	-------	-------	-------

Identifiers:

ALI	
CDD	
CDDA	
DYK	
FDU	
GUA	Guas dualito
GUASDUALITO	Guas dualito
MARACAY MAR	Maracay
MARGARITA	Margarita
MENEMAUROA	Mene de Mauroa
MONTECANO	Montecano
PTO	Puerto Ordaz
PTOORDAZ	Puerto Ordaz

MOI ALE Networks

A number of networks supporting various Ministries of the Interior (MOI) HF digital operations have transitioned to ALE-based equipment. Here are those positively identified thus far.

Morocco and Western Sahara

The Moroccan MOI can be heard using a combination of tactical and location-based identifiers on the following frequencies. Monitors have not yet reported any traffic following ALE.

Frequencies:

7740L	11442L	11489L	13879L
13900U	15000U		

Identifiers:

DAKHLA	Dakhla
DEPA	
DEPJL	
DEPL	
DEPM	
DEPN	
DEPS	
DEPT	
DG	
KENITRA	Kenitra
TANTAN	Tan Tan
WCNJL	

Algerian Oil and Gas Networks

There are two Algerian networks with identifiers clearly connected to the extensive oil and gas fields in that country's interior. It's therefore very likely that at least one, and perhaps both networks are operated by SONATRACH – the Algerian government's energy company. Although the precise function of each network is unknown they are probably connected to communications and security operations, and remote monitoring of the pipes. SONATRACH is also known to have procured the Racal MSM-1250 equipment which the ALE on these networks triggers.

Many ALE identifiers are the names of the fields themselves, or towns close by. Identifiers are also seen with

the common suffixes "GPL" and "30P". The assumption is that GPL is a contraction of Gas PipeLine, but the origin of 30P is unknown. Other identifiers carry the actual names of the pipelines – for example, Rhourde Nouss which is on the LR1 natural gas pipeline is "RNOUSLR1". It's likely that the many "SP" prefixed identifiers are guard posts or pumping equipment stations along the pipelines.

Frequencies Network 1:

5362	6981	7969	8055	9315	10244
11240	11466	11488	11489	18062	

Identifiers:

ALG	Algiers
ALR	Alrar
AMC	
BORMA	Hamadet El Borma or El Borma
GT	Gassi Touil
HAM	El Hamra
HAMRA	El Hamra
HBK	Hassi Berkine or Hassi Berkoul
HMD	Hassi Messaoud
HR	Hassi R'Mel
INA	In Amenas
INS	In Salah
OHT	Ohanet
RNS	Rhourde Nouss
TFT	Tin Fouye Tabankort

Frequencies Network 2 (all LSB):

5784	6790	7739	10211	10275
------	------	------	-------	-------

Identifiers:

ALRARGPL	Alrar
CNDG	
DEB	Debdeba
DEBDEB30P	Debdeba
GASSIGPL	Hassi el Gassi, Gassi El Adem or Gassi Touil
GASSI30P	Hassi el Gassi, Gassi El Adem or Gassi Touil
GR1GPL	GR1 Pipeline
GR2ORX	GR2 Pipeline
HAMRAGPL	Haoud El Hamra
HEH	Haoud El Hamra
HEHGPL	Haoud El Hamra
INA	In Amenas
INAS30P	In Amenas
MED	Medera
MEDER30P	Medera
OHT	Ohanet
OHT1GPL	Ohanet
OHT30P	Ohanet
NOU	Nouss
RNO	Rhourde El Nouss
RNOUSLR1	Rhourde El Nouss
SP1	
SP130P	
SP2	
SP228	
SP3	
SP328	
SP4	
SP428	

Algerian "KARIM" Network

The exact function of another Algerian operation, one using the long-known fictitious call sign "KARIM," is not yet fully known. It is most likely a Border Guard network.

Frequencies:

3620	5860	6945	8130	9175
------	------	------	------	------

Identifiers:

B12
B92
C13
C95
E13
H11
K33
O13
O23
P11
P12
KARIM2
KARIM3
R42
R52

Gabon Railways

The station identifiers of this network fit the locations of towns along Gabon's railway system. ALE appears to trigger mainly USB voice communications in French.

Frequencies:

7708 11200

Identifiers:

BB113
FRANCE Franceville
MBOUNGOU Mbougou
MILOLE Milolo
PCBOOUE Booué
PCOWENDO Owendo
RC1
CC11
CC17

Tentatively Identified Networks

Australia

This busy network was featured in Digital Digest a few months ago. The identifiers are strongly suggestive of the Australian Police, but as yet no traffic has been heard on any of the many frequencies.

Frequencies:

8055 9057 10450 11073.5 11164
12226 13375 14471 14675 14710
16270 18470 19060 19120 20420

Identifiers:

VBL VCP VCR VJJ VJZ VKA VKB VKC VKE VKF VKG
VKM VJP VKY VKW VOC VOX VTQ

UK

This very active and widely dispersed network carries three letter place name identifiers that are very suggestive of former British Diplomatic HF stations.

Frequencies:

6845 7992 9306 10392 10662
11008 11096 11523 12144 13149
13456 14580 14776 14814 15877
16640 16934 17490 18277 18974
19464 19977 20602 21867 23822
24268

Identifiers:

ALE identifiers and likely locations are:
ABA Addis Ababa, Ethiopia
AMM Amman, Jordan

ASI Asuncion, Paraguay or Ascension Island
AZQ Azores?
BLE Belgrade, Serbia
CUB
CYP Nicosia, Cyprus
DEL New Delhi, India
DKL possibly Dekhelia Sovereign Base, Cyprus
DUB Dublin, Ireland or Dubai, UAE
FC8
FP2
HFB
HSP Net Control Station, Hanslope UK
HS2 Net Control Station
ISL Islamabad, Pakistan
KIV Kiev, Ukraine
KUW Kuwait City, Kuwait
LAG Lagos, Nigeria
LUA Luanda, Angola
MOS Moscow, CIS or Mostar, Bosnia
PRI Paris, France or Pristina, Kosovo
RIY Riyadh, Saudi Arabia
RYN
SOG
SRP
VNA Vienna, Austria or Vicenza, Italy
YQE

Unidentified Networks

The "AFO, KAI, CH" Network

This network also has a large number of frequencies and has been heard the world over. ALE bursts are often link-protected and precede 110A-type PSK burst modem activity. This network is rumored to be run by the Swiss Diplomatic Service.

Frequencies:

5802 6980 6985 7720 7725
7915 9185 9308 10190 10238
13452 13457 15888 15893 16143
17452

Identifiers:

AFO
AFO1
CH1
CH11
KAI
KAI1

The "000000" Network

Rumored to be Iranian in origin, this network sports a very distinctive set of numerical ALE identifiers beginning "000000". It appears that the leading 6 zeroes are also dropped sometimes.

Frequencies:

6966 7620 7820 10360 11492
11495 11556 12134

Identifiers:

0000001111
0000001220
0000001230
0000001240
0000001290
0000004444
0000005555
0000006136
0000006137
0000006138
0000006666

The "BB1" Network

So-called since the identifier BB1 appears to do all the work on a number of channels.

Frequencies:

6864 7734 10614 10900 11349

Identifiers:

102
BB1
TSR
TYS

The "Spanish Animal" Network

This network is probably a Central or South American Army operation and sports identifiers made up of animal names.

Frequencies:

8047 9025

Identifiers:

CENTELLA
DRAGON
LEOPARDO
PISIS
TIGRE

Angolan Network

The identifiers and propagation characteristics of this network suggest Angolan locations. The ALE precedes Racial MSM-1250 modem traffic.

Frequencies:

7990 8859

Identifiers:

BGA Benguela
CUN Cunene
LD2 Luanda
KNK Kuando-Kubango
KSL Kwanza-Sul

The "X7, A5" Network

So-called due to the appearance of these two identifiers on all channels. This network has also been linked with Algerian MOI or Military operations, but this is as-yet unconfirmed. This is perhaps due to the similarity with some of the identifiers in the Algerian "KARIM" network.

Frequencies:

5430 5754 5855 7650 7786 7830
8046 8164 8096 8334 11130 12160
14550

Identifiers:

202
333
3333
5
A4
A5
B1
DP2
EC3
EC6
GF5
GLOBAL
I5
K2

L4
O1
O2
P2
P4
Q4
R2
T6
U7
V3
W2
X7

The "2222, 3333, 5555" Network

This network is again rumored to originate from Algeria. The user is unknown.

Frequencies:

7753 7966 8334

Identifiers:

0000
222
2220
2221
2222
3333
5551
5552
5555
5556
5557

The "VFO, TAC" Network

This network has a wide variety of frequencies and has also been heard the world over. ALE triggers encrypted voice and high-speed modem activity. Link-protected ALE is also used.

Frequencies (all LSB):

6847 8080 10155 11429 12103
17466 20400

Identifiers:

23F DCH
23R FON
24E FR3
4P0 FVJ
APM HLA
ASI LIO
ARI NF9
BG9 NR3
BRE OFM
BRZ PPZ
BUR RPI
CA2 SOS
CAS TAC
COS VFO
DCC

Acknowledgements

Thanks to Day Watson, Peter Thompson, Leif Dehio, Al W Hussein, Jack Metcalf, and MidAtlantic DXer for their help in putting this article together.

RESOURCES

Utility Monitoring Central
<http://www.mindpsring.com/~mike.chace>
Worldwide Utility News (WUN)
<http://www.wundub.com>
MIL-188-141A ALE Spec
<http://www.its.blrdoc.gov/fs-1045a/>
MIL-188-141A ALE Sound Clip
<http://rover.wiesbaden.netsurf.de/~signals/WAV/MIL-STD-188-141A.WAV>

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YAESU

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ICOM

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Super Select-A-Tenna	ANT 40	\$189.95
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ALINCO SCANNERS

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EBP-37N Standard battery	BAT 21A	\$39.95
EDH-16 battery case, 4 "AA"	BAT 22	\$9.95
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EDC-36 car lighter cable w/filter	DCC 14	\$23.95

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R3 Cigarette Adaptor	DCC 18	\$24.95
R2 drop-in charger	PWR 15	\$69.95
R2 CS-R2 cloning software	SFT 7	\$12.50
R3 software for Windows 95/98	SFT 14	\$19.95

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Inside the Lower Colorado River Authority

By John Mayson

Anyone who has spent time in central Texas has undoubtedly heard of the Lower Colorado River Authority or LCRA. According to their web site <http://www.lcra.org/>, the Lower Colorado River Authority is a conservation and reclamation district created by the Texas Legislature in 1934 and signed into law by Governor Miriam A. Ferguson to improve the quality of life in the Central Texas area. It receives no state tax money and cannot levy taxes. It operates on revenues from wholesale electric and water sales and other services.

The LCRA supplies electricity to more than a million Texans through 44 wholesale customers, including 11 electric cooperatives and 33 cities. It also serves numerous water customers, including cities, the rice-growing industry and municipal utility districts. The LCRA also provides many other services to the region, including managing floods, protecting the quality of the lower Colorado and its tributaries, providing parks and recreational facilities, and offering economic development assistance, helping water and wastewater utilities and providing soil, energy and water conservation programs.

If the LCRA sounds a lot like the Tennessee Valley Authority (TVA) you're not far off. Both are Depression-era, quasi-government entities dedicated to soil and water management and power creation and distribution. Both also have created conservation and recreation areas inside their jurisdictions. However, they differ in that the TVA is federal and the LCRA is a state agency.

LCRA Communications

From a radio hobbyist's standpoint, the most interesting service of the LCRA is their 900 MHz Ericsson Com-Net EDACS trunked

radio system that covers an area larger than some states. How large is their system? It's a multisite, 35-tower system with data and telephone interconnect capabilities covering 58 out of Texas' 254 counties. The coverage area runs along the Colorado River basin, roughly from Kerrville, north to Richland Springs and



An engineer inspects the controller hardware at LCRS headquarters in Austin (source: LCRA).

Brady, southeast to Victoria and Bay City, and includes the area between San Antonio and Georgetown.

The towers are linked together with a hybrid fiber and microwave point-to-point network. Computers at LCRA headquarters in Austin control the entire system. There is plenty of space on the system that allows public sector groups to have clear and ready communications. Some of the users include: Texas Department of Transportation, San Marcos Police, Hays County Sheriff's Office, Elgin Police, and the Boerne Police. Due to FCC restrictions and the LCRA charter, service can only be provided to government, public safety, and non-profit entities.

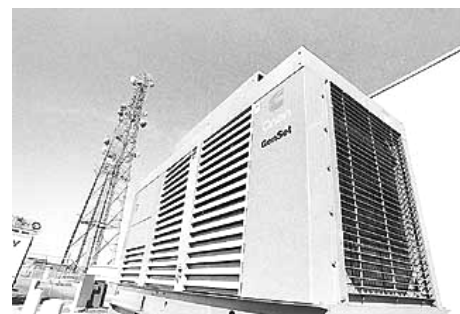
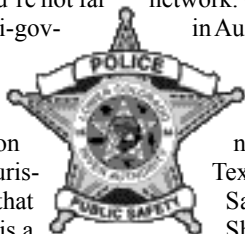
While cities and counties in central Texas have been proposing, building, and troubleshooting their own trunked systems, the

LCRA has quietly and successfully created what is one of the largest trunked systems in the United States. It offers virtually seamless communications to all of its users along a 300-mile long and 100-mile wide swath of central and southeastern Texas. It's quite an impressive system that is a lot of fun to monitor.

What You Will Need

Not too long ago LCRA relied on their VHF low band system for communications. Non-LCRA entities used their own VHF systems. As central Texas grew, LCRA outgrew their low band system and opted to build an EDACS 900 MHz trunked radio system. Prior to 1999 your only off-the-shelf solution to monitoring was scanning on a conventional scanner. With the advent of the Uniden BC245XLT and subsequent trunking capable scanners, true scanning of this system was made possible. The area is saturated with repeater sites, so even with the stock rubber duck antenna I can hear several of the repeaters.

As with all EDACS systems, the frequencies must be entered into your scanner in the correct LCN order. Determining the proper order often is a time consuming task unto itself. It's this procedure I find the most frus-



An Austin area tower and generator (source: LCRA).

trating, yet the most rewarding. There is virtually no useful information about this system published anywhere, so by monitoring and figuring out this system, you'll be blazing new trails. The information I present in this article comes from tedious research of the FCC database, driving out to different cities to monitor, and from various monitors on the CenTexComm email reflector hosted by eGroups.com. Fellow Austinite Robert Barker has been an enormous help to me in figuring out the talkgroups.



Twin towers of the LCRA Round Rock site and the Williamson County TRS.

The Future

Public safety communications are in a state of flux in central Texas. Bexar County, which includes San Antonio, is phasing out their Motorola analog trunked system in favor of a digital EDACS system. Austin has proposed a \$70 million digital Motorola trunked system for all of Travis County. Cedar Park chose not to join Williamson County's analog Motorola system and is instead building a trunked system of its own.

Mutual aid communications are virtually non-existent in central Texas, placing the lives of law enforcement officers and fire fighters on the line. When Travis County deputies and Austin police officers respond to a dangerous incident such as a hostage standoff, they have no way to talk to one another. Lack of communications in a high intensity, possibly lethal situation, is a dangerous mix to say the least.

We have problems within our city, too. A high-rise apartment building caught fire in downtown Austin. APD and AFD units responded, but again could not talk to each other. Firefighters needed police officers to

Table 1: Facts about the LCRA mobile radio system

The system can handle 12,000 mobile radios, though it is upgradeable to 40,000 mobile radios as growth demands system upgrades.

The system allows for 1,500 mobile data terminals (MDTs), though ultimately 10,000 MDTs can be used.

Data rate is 9,600 bps; it is spectrum efficient at 12.5kHz; and can migrate to 6.25kHz. The spectrum usage meets all current and proposed FCC requirements. The voice and data stream is currently analog and will eventually be digital.

Telephone interconnect capability, while limited, is available, as is portable coverage in designated locations.

Mobile coverage is 95 percent within the Colorado River basin and 90 percent elsewhere, providing reliable mobile communications to virtually every paved road in LCRA's service territory throughout Central Texas.

LCRA uses their trunked system to poll rain and river gauges, collecting and analyzing the data at their Austin headquarters.

control crowds and help with traffic control, but had to relay communications through two sets of dispatchers.

Listening to communications after a bank robbery has convinced me there is something seriously wrong with law enforcement communications in this city. Austin Police cannot speak directly to any neighboring jurisdictions including the various sheriffs' offices. The Texas Department of Public Safety, our state police, has a helicopter, but Austin relies on telephone calls and pagers to DPS to get the bird in the sky. Meanwhile the state troopers on the ground have no idea a bank robbery has taken place and could presumably drive right past the suspects.

I see the LCRA's trunked system as the perfect solution to central Texas radio woes. It would give police, sheriff, fire, and EMS units seamless wide area coverage. The system could easily be configured to allow effective mutual aid communications. A talkgroup or talkgroups could be

Table 2: Call letters assigned to the LCRA for trunked radio use

WPLV352:	Burnet, Fowler Ranch
WPLZ918:	Lometa, Boerne, Brenham, Columbus
WPLZ920:	Doss, Legion, Lukenbach
WPLZ926:	Cypress Mill, Mountain Top, Round Rock, Bastrop, Smithville
WPLZ929:	Flatonia, Gonzales, La Grange, Sealy
WPLZ933:	Valley View, Bay City, Washington
WPMI700:	Austin (North), Austin (South), New Taiton, Elgin, Hallettsville, Kingsbury
WPMZ642:	San Marcos, Richland Springs
WPNS694:	Junction
WPQA513:	Vanderpool, Schulenburg, San Antonio, Seguin
WPQE347:	Victoria, Brady, Mason

linked to the statewide VHF mutual aid pair or to the 800 MHz mutual aid frequencies allowing users not on the LCRA system or users from others parts of the state to communicate in time of crisis. Law enforcement could make use of the fleet talk to announce BOLOs. Since the infrastructure is already in place (at no cost to taxpayers, I might add), the various agencies would only pay for their radios and a monthly fee that would be a tiny fraction of the tens of million dollar price tags we're being handed.

In Closing

I have enjoyed figuring out the LCRA system. Lack of time has prevented me from driving out to every LCRA repeater to determine the LCN order and possibly find more users and talkgroups. I am very interested in hearing from you if you have information you'd like to share. You can visit my web site at <http://www.qsl.net/kc4vjo/radio/> or email me at jmayson.ee92@gtalumni.org.

About the author

John Mayson has been a radio hobbyist for almost twenty years and works as a test engineer in Austin, Texas.



Mansfield Dam (LCRA)

Table 3: Repeater Frequencies. LCN order is given when known.

Austin (North) 1=935.2500 2=938.7000 3=937.7000 4=936.6750 5=935.1375 6=939.7000 7=935.2250 8=935.4000 9=937.4500 10=937.9875 11=938.1875 12=939.4375 13=939.9250	939.9125 Boerne 1=935.4875 2=935.9500 3=937.0000 4=938.9625 5=939.9125 Brady 935.4875 937.4875 938.9625 939.9625	3=937.4500 4=938.0000 Elgin 1=935.6500 2=936.1750 3=937.2250 4=938.2500 5=939.2500 6=935.4250 7=936.2125 8=937.9625 9=938.2125 10=939.4875	Kingsbury 1=935.4125 2=936.0000 3=938.9125 4=939.0000 5=937.4375 6=939.4500 7=939.9000 8=939.9625 La Grange 935.4875 935.9500 936.4500 937.1375 937.4500 938.0000 938.4000 Legion 1=935.4125 2=936.0000 3=939.0000 4=939.4500 Lometa 935.3875 935.9750 937.9500 938.5000	2=935.9000 3=936.3875 4=937.4875 5=938.4750 New Taiton 935.4375 935.9000 936.3875 937.4875 Richland Springs 935.4625 935.9250 937.9750 939.1500 939.5000 Round Rock 1=935.4875 2=935.9000 3=937.0000 4=938.9625 5=939.9125 San Antonio 936.1500 938.0000 938.9250 939.9375 San Marcos 1=935.4625 2=935.9250 3=937.9750 4=939.1500 5=939.5000 Schulenburg 935.1375 937.6750 938.9000 939.9125 Sealy 935.3875	935.9750 937.9500 938.5000 Seguin 935.5000 936.4500 936.9000 937.4000 937.8875 938.1500 938.4000 938.4875 938.8875 939.4250 Smithville 935.7000 936.7000 937.2500 937.7250 Valley View 1=935.7000 2=936.7000 3=937.2500 4=937.7250 Vanderpool 935.3875 935.9250 938.5000 939.8875 Victoria 936.1500 938.0000 938.9250 939.9375 Washington 935.4125 936.0000 937.0000 939.4500
Austin (South) 1=935.2125 2=935.6750 3=936.2000 4=937.2000 5=938.2250 6=935.1750 7=936.7250 8=937.7500 9=935.2375 10=937.4625 11=938.6750 12=939.7500	Brenham 935.4625 935.9250 937.9750 939.1500 Burnet 1=935.7000 2=936.7000 3=936.9500 4=937.2500 5=937.7250 6=939.9375 Columbus 936.4875 937.9250 938.4250 938.7250 939.7250 Cypress Mill 1=936.7500 2=937.1750 3=937.6750 4=938.1375 5=938.7500 Doss 1=936.4500 2=937.1375	Flatonia 935.2500 936.6750 937.7000 938.7000 Fowler Ranch 1=935.6500 2=936.1750 3=937.2250 4=938.2500 5=939.2500 Gonzales 935.4375 935.9000 936.3875 937.4875 Hallettsville 935.2125 935.6750 936.2000 937.2000 Junction 935.3875 935.9750 937.9500 938.5000 939.8875	Mason 935.4625 937.4125 937.9750 939.5000 Mountain Top 1=935.4375		
Bastrop 936.2375 936.4250 936.9250 937.3875 937.4125 937.9000 938.4500 939.1375 939.4750 939.6750 Bay City 935.4875 935.9500 937.0000 938.9625					

Table 4: LCRA Talkgroups

02-001 LCRA Control Center
 02-002 LCRA Control Center
 02-010 Texas Department of Transportation
 02-011 LCRA
 02-025 Unknown
 02-050 LCRA Lockhart Power Crews
 02-051 LCRA Giddings Power Crews
 02-052 LCRA Bastrop Power Crews
 02-054 LCRA Giddings Power Crews
 02-062 LCRA TC24
 02-063 LCRA
 02-066 LCRA Control Center
 02-073 LCRA Rangers Dispatch
 02-074 LCRA Rangers Car-to-Car
 02-075 LCRA Bike Rodeo
 02-081 LCRA East Communications Center
 02-083 LCRA Central Communications Center
 02-086 LCRA

02-087 LCRA
 02-091 LCRA River Operations
 02-102 LCRA
 02-103 LCRA
 02-113 LCRA
 02-114 LCRA
 02-122 Marble Falls Bike Rodeo
 02-132 969 VFD Dispatch
 02-133 LCRA
 02-136 Hays County Intercity
 02-141 Hays County Sheriff's Office Dispatch (155.865 MHz simul-cast)
 02-142 Hays County Sheriff's Office
 04-011 Capital Area Rural Transportation Service
 04-012 Capital Area Rural Transportation Service
 04-013 Capital Area Rural Transportation Service
 04-014 Capital Area Rural Transportation Service A Channel
 04-051 San Marcos Police Dispatch
 04-052 San Marcos Police
 04-054 San Marcos Police
 04-055 San Marcos Police

04-056 San Marcos Police
 04-061 LCRA
 04-072 LCRA
 04-073 Unknown
 04-081 Boerne Police Dispatch
 04-082 Boerne Police Channel 2
 04-083 Boerne Police
 04-087 MDT
 04-101 Fredericksburg Police Dispatch
 04-103 Fredericksburg Police
 04-121 Unknown
 04-124 Unknown
 10-025 Elgin Police Dispatch
 10-026 Elgin Police Channel 2
 10-031 Bastrop County Sheriff's Office
 10-035 Texas Department of Transportation
 10-037 Texas Department of Transportation Courtesy Patrol
 10-043 Unknown
 10-073 Texas Department of Transportation
 10-079 Texas Department of Transportation
 15-143 LCRA EOC

Table 5: Determining LCN Order

LCRA was actually fairly kind to radio monitors when they planned their frequencies. Many of their sites are configured such that the LCN order is simply the numerical order of the frequencies. Here are a few tips that can help you determine the LCN order of an LCRA repeater. Some of these tips can be applied to any EDACS system.

Most, but not all, LCRA repeaters have the control channel on LCN 1. This will not apply to EDACS systems in general.

One feature of the Uniden BC245XLT is the ability to display the frequency being received while trunking. This is accomplished by pressing and holding down the LIMIT key until you hear two short beeps. If you have a second scanner, or are quick to take the Uniden out of trunk mode, you can determine if the LCN order of a particular frequency is correct by comparing where the scanner sent the reception of the transmission and where it actually went. This is best demonstrated with an example.

Suppose a local EDACS system has five frequencies: 935.0000, 936.0000, 937.0000, 938.0000, and 939.0000 MHz. Let's assume 936.0000 MHz is the control channel. Enter the frequencies in numerical order, and then enter the same frequencies into another scanner. Start trunk tracking the system with your Uniden, remembering to press and hold the LIMIT button.

Soon you lock onto a talkgroup. The Uniden is flashing between the talkgroup identifier and the frequency, which is 935.0000 MHz. On your other scanner in conventional mode, you hear the same conversation on 935.0000 MHz. You have now proven LCN 1 is 935.0000 MHz.

You continue scanning. You get another talkgroup, but you have an awful buzzing noise coming from your Uniden which is flashing 936.0000 MHz. Your conventional scanner has stopped on 939.0000 MHz. This tells you 939.0000 MHz is in the wrong slot. The EDACS system sent your Uniden to LCN 2 which should've been 939.0000 MHz. Instead you went to 936.0000 MHz which is the system's control channel. Swap the two. Your LCN order now looks like this:

- 1=935.0000 MHz
- 2=939.0000 MHz
- 3=937.0000 MHz (not verified)
- 4=938.0000 MHz (not verified)
- 5=936.0000 MHz (not verified)

Continue the process until you have determined all of the LCN designations. You might find that all the frequencies are not being used. On systems with many frequencies, you will want to scan in conventional mode, locking out the frequency as you hear traffic, until you no longer receive anything. Review your lockout list and place those frequencies at the top of your LCN order and the inactive at the bottom. While it is possible the active frequencies could be assigned a higher LCN number than the inactive, it's been my experience this is not usually the case.

Those of you with access to the Internet might want to visit the GTRAC LCN page at <http://ourworld.compuserve.com/homepages/brennan/eprog.htm> for more information about LCN.

Table 6: Key to Acronyms

BOLO: Be On the LookOut. When a major crime suspect flees the scene, law enforcement agencies will issue a BOLO asking all officers to look for this person.

EDACS: Enhanced Digital Access Communications System. A trunked radio system first developed by General Electric, then sold to Ericsson.

LCN: Logical Channel Number. Unlike other trunked systems, the order in which EDACS frequencies are entered into a scanner is important. Follow the LCN order (see Table 5).

LCRA: Lower Colorado River Authority. A governmental entity in Texas tasked with managing water, power distribution, and land in central Texas.

TRS: Trunked Radio System.

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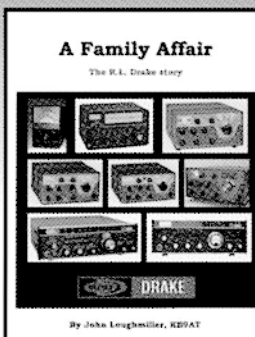
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StarBand vs. DirecPC: High Speed Internet Access Via Satellite

By Ken Reitz KS4ZR

Five years ago most of us didn't know the Internet from a hair net and now we can't get through the day without checking our e-mail or surfing the Web. As with all modern electronic conveniences we've quickly found we're lost without them. Anyone want to give up their VCR? Digital satellite dish? Cell phone? I didn't think so. Still, with each of these contraptions it's not long before we've worked up a list of complaints.

One of the biggest complaints consumers have with the Internet has to do with the speed with which we can work the Web. While most computers now come with modems capable of 56 kilobits per second (kbps) many find that the best they can get out of their Internet Service Provider (ISP) is 32, 28 kbps or less. So, no matter how fancy your computer is, how fast the processor speed, or how high your modem is capable of operating, you can only go as fast as

your ISP connection. It's like trying to run a foot race with a couple of cinder blocks strapped to your ankles.

There are alternatives. Folks living in areas where digital cable service is provided may have access to high speed Internet service with speeds up to 500 kbps. The beauty of this service is that it doesn't use a telephone line at all. It uses fiber optic cable to allow expanded cable TV service, as well as two way Internet activity. Other areas are served with Integrated Services Digital Network (ISDN) and Digital Subscriber Lines (DSL) capable of duplexing your phone line with Internet access. You can get high speed Internet access and make and receive phone calls on the same line at the same time.

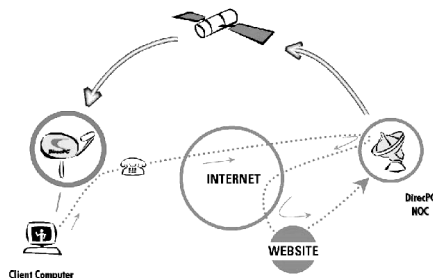
Unfortunately, digital cable service, DSL and ISDN lines are currently the privilege of select cities. The rest of us are left to plod along the information super highway at a walking pace. Or are we?

tions center at up to 56 K. (See *News Flash regarding the new DirecPC 4.0 - ed*)

While this plan has drawbacks, it certainly answers the problem of being able to receive high speed data necessary to download audio or video streaming web sites which are simply impossible on clogged land lines at speeds less than 56K. DirecPC also allows you to receive DirecTV programming via the same dish (called a DirecDuo system) which features a dual feed for downloading Internet data and satellite programming. A separate subscription for the video services is required.

If you want to keep your existing cable, C-band satellite or DISH network programming you can still get DirecPC by getting their single-function DirecPC dish with satellite modem. By starting out with a DirecDuo dish you can add DirecTV later if you wish. The single-function system typically retails for about \$150 while the

DirecPC One-Way Satellite Internet Service [<http://www.direcpc.com/consumer/what/services.html>]



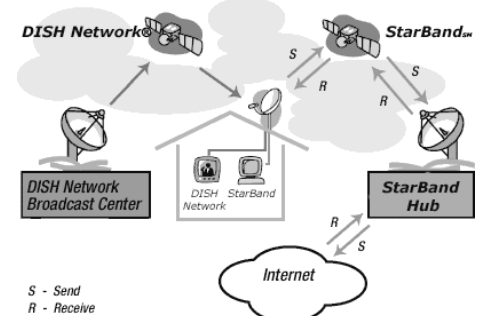
Accessing DirecPC's Operations Center via land line brings Internet data to your computer via satellite at speeds up to 400 kbps (eight times faster than a 56K modem).

Help from Above

Just as the small dish satellite TV revolution successfully challenged the domain of cable TV, satellite delivered Internet access is offering a real alternative to phone line Internet access. Particularly in areas where there's not likely to be high speed Internet service for years to come. There are currently two companies offering such service, each with their own little twist on delivery.

The first company to address the problem of high speed Internet access was **DirecPC**, a product and service of Hughes Network Systems. Using a 24 by 36-inch elliptical, off-set fed satellite dish for reception and a high speed satellite modem attached to your computer, web sites can come screaming down at 400 kbps. DirecPC 3.0 uses a standard telephone modem to route your Internet requests to their opera-

StarBand Two Way Satellite Internet Service [<http://www.gilat2home.com/howitworks/index.htm>]



Accessing StarBand Hub via home based satellite transceiver brings Internet data to our computer at speeds up to 500 kbps.

DirecDuo system typically sells for \$550. Limited Internet access (25 hours/month) can cost as low as \$20/month (you provide your own ISP), or, for \$30/month they'll give you the same limited access and their ISP. Unlimited access using your ISP is \$40/month while unlimited access with their ISP is \$50/month. DirecPC requires a VISA, Mastercard or American Express account for billing purposes.

The second company to enter the market is called **StarBand** and is the combined efforts of a strategic partnership which includes Gilat Satellite Networks, Microsoft, EchoStar (the bucks behind DISH Network TV) and the more than 7,000 Radio Shack locations which will be selling the StarBand system and the specially designed Compaq computers in which the satellite modem will be built in. StarBand differs from DirecPC in that it requires *no* phone line. Instead, the satellite modem is actually a satellite transceiver capable of sending as well as receiving high speed Internet data using the 24 x 36-inch StarBand dish. Download speeds may be as high as 500 kbps and uplink speeds as high as 150 kbps. This would be most useful in transmitting large chunks of data such as photographs.

You may use your current computer if it measures up to StarBand requirements (see chart) or you can have Radio Shack "build" a Compaq Presario 232 computer for you. To do so you'll have to deposit \$300 at your Radio Shack dealer and cough up another \$950 when your computer arrives. Thereafter, StarBand's

unlimited, high speed up/down link service will cost \$60/month. For customers who already have a capable computer the StarBand Model 180 satellite modem will be available through DISH Network dealers. The satellite modem plugs into an existing USB port.

StarBand/DirecPC Pros and Cons

If you're just starting out in the world of Internet activity and don't have a personal computer at home the StarBand/Radio Shack/Compaq computer seems a good route to take. You'll get a great computer tailor made for StarBand Internet use. If you've already got a computer capable of handling the high speed satellite delivery requirements, the initial investment in the dish/modem for either system will not be that significant. And, if you look just at the monthly service fees there's only \$10 difference between the two radically different services. Prices for both services are closely parallel to what you'd pay for a DSL line, if you could get one.

You only need to decide if you have to be transmitting high speed data to make the choice. For instance, if you're downloading streaming audio or video web sites there's no need for high speed uploading. Once you're connected to the site you're no longer using any uploading. With the DirecPC system you can still use your phone line to make and receive calls just as with StarBand until you wish to disconnect.


Either one of these two systems is just what people in rural or underserved suburban areas need to allow them to have high speed Internet

services. The comparisons between small dish satellite TV and what it's done for underserved cable-TV areas can't be ignored. It could be years before most areas of the U.S. are served by high speed data land lines. Still, other comparisons shouldn't be ignored either. Six years ago, at the dawn of the small dish satellite TV revolution, there were five satellite TV service providers. Now there are two.

With only two satellite-delivered high speed data systems on the market it's legitimate to ask which is more likely to survive. In addition, monthly subscription rates for original satellite TV programming were considerably less than they are now. It's entirely possible that quoted monthly rates for unlimited Internet access could rise as dramatically as they did for satellite TV, particularly if one service is forced out of the market.

Another consideration is system installation. StarBand installations must be professionally installed. This is because the system is actually a satellite transceiver and StarBand wants to make sure your signal is actually getting to the satellite. For this reason StarBand can't go mobile on the road with you, either. The installation has to stay put. On the other hand, DirecPC systems can be installed by the consumer and they can be carted around the country just as DirecTV and DISH satellite TV systems can.


In addition, while both claim to provide high speed service, there may be times when data delivery drops far below advertised speeds. StarBand states, "...StarBand's goal is to pro-




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vide 150 kbps download speeds and upload speeds of 50 kbps during the busiest hours on the net." You have to decide if such a significant drop is worth paying a premium price. They also warn that "...StarBand reserves the right to limit 'bandwidth hog' activities such as audio and video streaming, and automatic file exchange applications (file-sharing)." And, finally, while you may have a personal web site on StarBand, you will not be allowed to host a web site using StarBand equipment.

DirecPC and StarBand System Requirements

DirecPC*

Processor: 200 MHz Pentium with available USB or PCI port
Memory: 32 MB RAM (minimum) and 20 MB hard drive space
Modem: 28.8 kbps
Down load speeds: Up to 400 kbps
Access speeds: Up to 56 kbps depending on your ISP
Operating System: Microsoft Windows 95/98 or Windows NT 4.0 (PCI) Windows 98 (USB)
Extra attractions: A DirecDuo dish can be configured to receive DirecTV programming.
Cost of service: \$50/month (includes unlimited online time and ISP)
Satellites used: GE-1 (103°W) and Galaxy 3R (95°)

StarBand*

Processor: Pentium-class with available USB port
Memory: 32 MB RAM, 10 MB hard drive space and a CD-ROM drive
Modem: StarBand satellite modem +
Down load speed: Up to 500 kbps
Up load speed: Up to 150 kbps
Extra Attractions: Same dish can be configured to receive DISH Network programming
Cost of Service: \$60/month includes unlimited online time and ISP
Satellites used: GE-4 (101°W) and Telstar 7 (129°W)

*Both services require a view to the southern sky for a direct line-of-sight with the satellite and use a 24"x36" elliptical, off-set fed dish. Each provides one e-mail account.

+StarBand does not use a land based telephone line for transmitting data to the Internet.

DirecPC, which has tens of thousands of customers and has been up and running for several years, has long experienced system downgrading. As with StarBand, DirecPC customers find that download rates aren't always at top speed. This appears to simply be a fact of Internet access life. But, it's legitimate to wonder if either service will be able to keep up with ballooning subscriber lists and provide the advertised top speed. Furthermore, if you sign on with their ISP there might not be a local number for access depending on where you live. You may have to make a toll call to connect.

Both systems will suffer from "rain fade," a fact of life at Ku-band frequencies in which heavy rain makes microwave penetration impossible. The effect lasts only as long as the heaviest downpour when service goes back to normal. And, finally, reports indicate that DirecPC will introduce a high speed uplink component to its system which will put it in more direct competition with StarBand. No details on this proposed service were available as this was written.

How to Get Started

With continued growth in the numbers of consumers just getting on the information super highway on-ramp we can all expect congestion on Internet services which use traditional telephone lines to follow that trend. For the millions of Americans who will not have access to high speed data lines for years to come DirecPC and StarBand represent a turbo boost in Internet use enjoyment. Consider the pros and cons of each system and visit the web sites listed below to do a little digging before making a decision.

For information on DirecPC go to <http://www.direcpc.com>. DirecPC systems are widely available on the Internet and through major retailers such as Circuit City, Best Buy, etc. For a local dealer near you call 800-DIRECPC.

Starband from the view of a "pilot"

By Bill Grove, MT Art Director

A few months back, I was one of the privileged many to be part of the Starband "Pilot" program. For a little bit of cash, Starband provided me with a complete Dell computer package bundled in tow with the proprietary satellite cards and software installed. Since our area is part of the technological black hole (we're about 5-10 years behind any major city) I was thrilled at the prospect of having high speed internet access in my home at a fairly reasonable rate. Here's what I've learned.

The Starband network offers two ways to access its system. First, you can go to Radio Shack and buy a pre-loaded Compaq computer with the satellite cards installed or second, you can go to an Echostar dealer and buy a USB box that sits outside your current computer (your computer must meet the minimum requirements) and serves the data between your computer and the satellite.

My choice would definitely be to have the USB box. As nice as it is to have another computer in the house, it's all but dedicated to serving the other computers that I own and have networked through the Dell (the dedicated Starband system). I don't use the Dell for anything else because, during the pilot program, if I used it, it crashed the connection to the satellite! Don't be too worried, because it's now quite stable and I'm sort of nudging towards using it again, but I'm still rather gun shy due to the initial experience.

Even so, if you don't need another computer in the house, the USB is still the way to go. Even if you *do* need another computer in the house, make sure the Compaq suits your needs. Since I come from a background of computer sales, I'm not particularly fond of "all-in-one" package deals. I prefer to build the system myself using the parts I choose. But that's off the subject... back to Starband.

There are amazingly wonderful things about Starband. First off... NO PHONE LINES... second... NO LOCAL ISP (Internet Service Provider). I can't stress those two enough. The fact that you don't rely on your local phone service or your local ISP is a blessing in itself. I have had entirely too many shouting

For more information on StarBand go to <http://www.starband.com> or your local Radio Shack dealer. Information on StarBand can also be found at select DISH Network dealers.

News flash from DirecPC

DirecPC is in the process of releasing its own two-way service, DirecPC Satellite Return. The new system offers return channel speeds up to 128 Kbps, optionally 256 Kbps, and delivers data at the same speeds as the current product, at rates of up to 400 Kbps. According to the company, "Pricing will be competitive to other available broadband services." Look for the service at DirecTV dealers, and from Earthlink, Pegasus, and Juno.

matches with both companies – each of them telling me the problem is the other's fault. Since I have had the satellite in, I haven't dialed into the ISP once. It's most gratifying! Not only am I completely isolated from the daily problems that plague the dial-up world, but this service is *really* fast. I average download speeds of around 600kbps, which roughly translates to 15 times your current best dialup speed. Nice.

Now the down side. Since you're chatting with a gadget that is 22,000 miles from Earth, you run into a small problem called "ping time." Ping time is the time it takes you to send a signal from your computer, to another computer, and back again. When you're dealing with Starband, the ping time is averaging around 750ms, which to humans isn't that much, but to a computer, it seems an eternity. So what does this mean in layman's terms? It means that you can't use VOIP (Voice Over IP, or real-time phone calls), you can't play games (it takes nearly a full second for you to realize that your friend has snuck around the corner and is launching a rocket right at you), and you can't do interactive video conferencing.

Fortunately, for most of the world, those things aren't *that* important. You still get your email, you still have your web pages at blazing speeds, you can still download your music and you can still send the photos of the kids to their grandparents. For most day-to-day internet use, this is a wonderful solution. You can also tie all the computers in your house into one Starband system so that everyone is online at the same time (this requires you to network your computers, but it's quite simple and fairly inexpensive). And remember, *no phone lines... no local ISP!*

Be aware that users should definitely NOT attempt this installation on their own. Starband won't even sell you a system without a professional installer, and in this case, they are right. This is not easy to install and *must* be mounted properly. Overall, the Starband gets a huge "two thumbs up" for providing fast, always-on internet access to the 40% of Americans that don't have another alternative for broadband. For more info, just drop by <http://www.starband.com>.

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WWBS: The Little Station that Could

By Hans Johnson

Retirement can take many different forms. For some, it's tooling around the country in an RV, for others, it's chewing the rag with scores of friends around the world. For Charles Josey, it was building a shortwave station.

Josey wasn't content to buy some parts off the shelf and assemble a station; he carefully shopped and scrounged to complete the construction. Charles has a real knack for finding parts for at a fraction of their cost. He also has the knowledge to put them all together. The real hurdles for WWBS weren't in its construction; rather they were difficulties associated with its location.

Charles' wife, Jo Ann, owned a commercial building on the edge of downtown Macon, Georgia. It was here, with a television station across the street and a recording studio nearby, that Josey built WWBS. Most American shortwave stations have settled in rural areas – after all, land is cheaper and there are less problems with neighbors, as there are a lot fewer of them.

A Reluctant Pioneer

Charles applied for a license to broadcast in amplitude modulation (AM), but the FCC required him to transmit in compatible single side band (SSB). Any radio could still potentially pick up WWBS, but the FCC hoped the lower power requirement would reduce potential interference. Or so it was hoped.

So by fiat, rather than by design, WWBS became the first compatible SSB station in the United States. (Fellow Georgia station WGTG was the first to use SSB, but it operates on SSB only, requiring a radio capable of

receiving SSB broadcasts.) The minimum power for an American shortwave station using AM modulation is 50,000 watts. A compatible SSB station only has to reach 50,000 watts at peak power, so WWBS' average power is about 12,500 watts, sometimes less.

The blessing in disguise has been greatly

reduced electrical bills for WWBS. WGTG had realized this as well. WBCQ in Maine also soon took advantage of the savings, placing its own compatible SSB transmitter on the air by early 2000.

Trouble with the Neighbors

Charles Josey had no trouble converting the station over to compatible SSB. He soon had authorization from the FCC to "test with programs" in late 1998. Yet, even in compatible single side band, WWBS was soon causing interference to both the television station and the recording studio. Josey, an amateur radio operator, tried to solve the problem in the amateur radio tradition – by extending a helping hand and trying to work with both parties.

Josey even went so far as to purchase the filters needed to eliminate the interference. Some of these filters were installed at the neighboring TV station, solving half of the equation, but the recording studio turned out to be much more problematic.

It seemed that no matter what WWBS did, even to the extent of completely rearranging its broadcasting schedule, the recording studio wasn't satisfied. Matters eventually turned ugly and in typical American fashion, the recording studio sued WWBS. The suit was eventually dismissed, but the ongoing problem delayed WWBS' ability to begin regular transmissions by several months. Charles Josey does state that they haven't had any interference problems since the fall of 1999.

A Change in Plans

As mentioned, the ongoing problem with the recording studio also took a toll on WWBS'



"Location, location, location" is critical in broadcasting as well as in real estate, and Macon, Georgia's WWBS is a prime example of the problems a less than ideal site can create.



Charles Josey has a knack for scrounging parts and constructed the station himself. Inadvertently, WWBS became a pioneer in US shortwave broadcasting because of the mode in which it broadcasts.

operating schedule. The Joseys' original plan was to broadcast Christian programming to Canada, particularly western Canada, on a beam of 330 degrees, on weekend evenings. To placate the studio, WWBS tried a short-lived early morning service to Australia and New Zealand on weekends. Now the Joseys have settled on a European service, but given the broadcasts times, it amounts to a defacto North American service.

While their sincerity of wanting to air Christian programming and spread the Gos-

pel is never in doubt, one does wonder how much thought the Joseys gave to programming. It's as though all their energy was expended in simply getting WWBS on the air, with "details" such as programming assumed just to fall in to place. WWBS is giving away its airtime, so money is certainly not the motivation. But the Joseys have entered a rather saturated field, joining well over a dozen stations that are already broadcasting English language Christian programs for a North American audience.

How to Tune In

WWBS broadcasts four hours a week from 0000-0200 UTC Sundays and Mondays on 11900 kHz. As with other American stations, identification is on the half-hour, with Jo Ann identifying the station and asking for reception reports. Those reports can be sent to WWBS, P.O. Box 18174, Macon, GA 31209 or to wwbsradio@usa.com. The station does not have a website.

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Your Beginner's Q & A

The last couple of months saw quite a lot of response from readers here at the Beginner's Corner. Some of you had questions, comments and tips of your own which I'd like to take this opportunity to share.

◆ Tunerless All-Band Antenna

It was really heartening to hear from so many *MT* readers on this subject. Obviously, antennas are a burning topic to all readers, but shortwave listeners are always looking for ways to improve reception. My thanks to everyone who took the time to write.

A number of readers wanted a little more detail about the connections at the 4:1 balun. It's really very simple; the insulation is stripped away from both sides of one end of the twin lead and inserted into the connecting lugs at the top of the balun. The lugs are then crimped with a pair of pliers and it's secure. It wouldn't hurt to solder the connection, but it's really not necessary.

Another question was about grounding the antenna during a thunderstorm. Common practice among hams is to drive an 8-ft copper grounding rod into the ground at the point where the antenna feed line goes into the house. A heavy gauge copper wire is attached to the rod and the wire fed into the house along with the feed line; an SO239 coax socket can be soldered to the end of the wire. When a storm comes up or you plan to be away from your receiver for extended periods of time, simply attach the antenna connector to the coax socket. Now, any voltage coming down the antenna is shunted directly into the ground.

Some who wrote indicated that they had never used an outside antenna, let alone built one. It was encouraging to see so many willing to take the plunge. That's what the radio monitoring hobby is all about: expanding your horizons. Those of you who have built and are using the antenna no doubt share the amazement I had in being able to effortlessly cruise the shortwave guide in the center of this magazine and tune in virtually any station listed. It really adds to the listening pleasure of the shortwave hobby to be able to do this.

One reader from New York noticed that the number listed for Amateur Electric Supply, the source for the 4:1 balun, was not correct. The correct number is 800-558-0411.

Another correction is that what I called the "Hy-Gain center connector" from Surplus Sales of Nebraska, is actually listed on their web site as the "Hygain Center Insulator."

There were a number of suggestions for other shortwave antenna subjects for future columns and I'll certainly check them out. These and other suggestions from readers are always welcome at the Beginner's Corner.

◆ The Perfect Shortwave Radio

Paul Perretta, an *MT* reader in Hawaii, writes in response to the November 2000 column: "...my renewed interest in ham radio was prompted by purchasing one of these [small portable shortwave radios] for \$89.95 new from a Radio Shack sale...in some four months of casual listening with an indoor piece of wire which is 1/4 wave at 28 MHz and 1/8 wave at 14 MHz I have heard some 1,400 plus different ham prefixes (all mode all band but mostly 14 and 28 MHz). Granted, this is no communication receiver...but it shows what can be achieved when you know where, how and when to listen!..."



Winner of the perfect shortwave radio search? The Sangean ATS-818CS or Radio Shack DX-392. Courtesy: Sangean

An excellent point, Paul. It also shows how much easier it is to receive than to transmit. Trying to get a signal out using a 1/8 wave at 14 MHz would be a real challenge.

Part of that same column showed how to tape shortwave programs for listening in the car on your daily commute. This prompted Judy May to comment: "Wow, you nailed what I do, even down to the radio! I use the Radio Shack version of the Sangean (DX-392), and

have been recording 'The World Today' for my commute ever since the O. J. Simpson trial gummed up our televised nightly news here in the U.S...."

She also comments "...my [radio] uses a few AA cells for the electronics and memory, but four D cells for the radio and recorder...I use Nicad rechargeable. I used to use an AC adapter, but in our new house the adapter gives the reception a real bad hum..."

It is surprising how many batteries a radio with built-in cassette player can take, and that's something consumers need to think about when making a portable radio purchase. Even rechargeable batteries can add considerable expense to your hobby.

As to the hum in the adapter, it may not be the adapter at all. Here are some things to try: Take the radio to other rooms in the house which are on other circuits and see if the problem persists. Next, look around the house for any dimmer switches which may not be turned completely off. Finally, get another adapter and try it. It's possible the filtering in your adapter (if it has any) is defective. It's certainly worth the \$15 or so to get one which works.

On the same subject, Byron Hinton commented that it should be possible to download BBC or other shortwave broadcasters, or any other broadcaster for that matter, from the Web to an MP3 player to listen later on a PDA device like a Palm Pilot or Handspring Visor. Sounds like a good idea, especially if your daily commute is actually a daily walk! I have a friend who downloads the BBC into a Palm Pilot and listens in the car – no radios involved!

◆ Other Beginner Issues

- *MT* reader Kermit Allen writes, "...I have just moved from Los Angeles to San Jose, California; can you tell me where or what books to get to use with my scanner so I can listen to the emergency services in this area?"

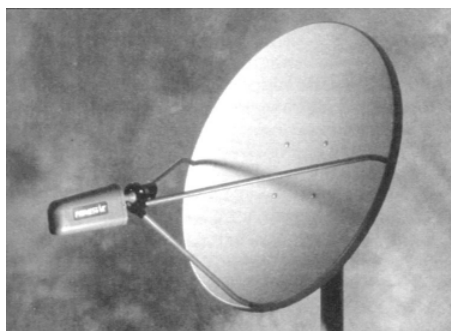
I've found that, in my area, local Radio Shack stores make unofficial frequency lists available to customers. These include local public services, ham repeaters, etc. They're usually included with the purchase of a scanner from the store as a way to get the customer started.

If none are available, the best place to look is *Police Call*. These scanner frequency list books are available from Radio Shack for

\$15 each. *Police Call* publishers have divided the country into seven regions with a separate book published for each region. Lists include frequencies for police, sheriff, fire, ambulance, race car teams, security, amusement parks, casinos, hotels and much more. The entire *Police Call* list for all regions is available on CD-ROM for \$35.

- There are a couple of satellite TV questions, too: Fabian Husley wanted information on a Uniden PS100 satellite receiver. The best place to go for information about any Uniden product is Uniden's toll free number: 800-235-3874. They can repair any Uniden product (satellite receiver, scanner, 10 meter transceiver etc.) for a reasonable fee. They also sell reprints of lost users manuals and schematics and often sell factory refurbished equipment at considerable savings. Check out their web site <http://www.unidenamerica.com>

- Several readers, including Joe Crawford, wanted to know if there was anything to be done with an old Primestar satellite TV system. Primestar was a standard Ku-band system and, while the receiver won't be of much use, the dish and LNB can be used with an analog receiver to tune in analog channels such as the sports and news backhauls on SBS-6 or the several channels of NBC programming and news feeds on GE-1. If you hook up an MPEGII receiver you'll get lots of interesting programming from around the world on Telstar 5.



Turn satellite entertainment junk into useful TVRO hobby. Courtesy: Primestar

Analog receivers can be found for \$25 or less at hamfests. MPEGII receivers can be bought for around \$200. For information on MPEGII receivers check out <http://www.smalllear.com>, for a list of all available satellites and what's on them go to <http://www.lyngsat.com>.

- John Morris has been an *MT* reader for about 10 years but has stayed away from satellite reception because of the dish size and overall high cost. "Recently," he says, "satellite receivers have been finding their way into the local second hand store..." Now he's interested in taking advantage of the plentiful used equipment at cheap prices.

So, here are some tips on looking at used satellite TV gear. First, if there is no remote control find out if all functions can be performed using buttons on the front panel. You

may have to get a universal remote to operate the receiver. If there's no owner's manual you should be able to find one at <http://www.houstontracker.com>. Just about any receiver will work with any size dish 4.5-ft. and up.

You'll need a dish and the feed horn/LNB (the dish electronics). This might be where the used Primestar dish comes in! Used dishes complete with polar mount, dish drive and feed horn electronics can often be found very cheap at your local satellite dealer or for free from someone in your area switching over to the small dish systems. At any rate, you'll need a length of RG/6 coax to connect the dish to your receiver and possibly wires to connect to the servo motor to change polarity. If you are using an LNB there won't be a servo motor and no need for the connecting wires because the polarity is changed by the receiver via the coax.

Set the dish up in your yard with an unobstructed view to the south and west. Take the receiver, a TV set and the connecting cable out to the dish and set it up. Make all the connections (LNB to the receiver, dish drive motor wires from the receiver to the dish drive motor, and output of the receiver to your TV set to channel 3 or 4—whichever the receiver outputs to). This way you can line the dish up on the Clarke Belt and get it operating before routing the cable back to the house and setting up a permanent installation.



Uniden BC780XLT

IT WAS WORTH THE WAIT...

THE ALL-NEW UNIDEN BC780XLT TRUNKTRACKER III!

This next-generation scanner is an astounding step forward! Follow conventional communications, or any of the three leading trunking technologies Motorola, GE Ericsson EDACS, or Johnson Letter simultaneously! Up to 500 channels and 10 priority frequencies may be stored in 10 memory banks. And if you don't know your local frequencies, simply use a computer and modem to dial Uniden's 900 telephone number, and SmartScanner technology will do the rest!

Other features include the life-saving S.A.M.E. weather alert function, alphanumeric display, continuous 25-1300 MHz frequency coverage (less cellular), 10 factory-preprogrammed service searches, brilliantly backlit LCD, fully backlit keys, AM/FM/WFM reception modes, base or mobile configuration, computer control, CTCSS/DCS squelch systems, and more!

Yes, the BC780XLT is the scanner we've all been asking for, and you can order it now from Grove Enterprises!



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ORDER SCN49
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Grove Enterprises, Inc.

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7540 Highway 64 West

Brasstown, NC 28902

828-837-9200 828-837-2216 (fax)

order@grove-ent.com

**CALL
NOW!**

www.grove-ent.com

Q. On shortwave broadcast schedules I frequently see references to the "CIS;" what and where is this? (Bob Brossell, Pewaukee, WI)

A. On December 8, 1991, the leaders of three Soviet republics – Boris Yeltsin of Russia, Leonid Kravchuk of Ukraine, and Stanislav Shushkevich of Belarus – met in a summer cottage near Minsk and replaced the former Soviet Union with the Commonwealth of Independent States (CIS).

Q. What ever became of the old Regency scanners? Will we see any more of them soon? (Bob, e-mail)

A. RELM (Regency Land Mobile) is the current land mobile division of the former Regency Electronics which was purchased, along with Electra (Bearcat) by Uniden back in the mid-80s. No more Regency scanners were produced until a couple of years back with the HS100, HS200, MS100, and MS200 units. They weren't very successful in competing with the Uniden/Radio Shack dominated consumer radio market. I don't look for any more Regency scanners in the foreseeable future.

Q. What are the "bubble machines" I occasionally hear on shortwave? (E-mail request)

A. These are intentionally generated jamming transmissions among political adversaries. Several different types may be heard, including bubbles, sweepers ("swish-swish"), and the notorious "diesel engine" sound! The vast majority of these come from Communist and Eastern bloc countries and are intended to discourage international broadcast listeners from hearing programming

content with which the jamming country disagrees.

Q. My scanner preamplifier seems to clean up some of my weaker signals by reducing static, but on other signals it seems to do nothing. Would you advise me to put two preamps in series? (Tom, e-mail)

A. The purpose of a preamplifier is to increase the level of signals above the noise floor ("hiss") of the scanner. As such, a preamp must do two things: provide a very low noise figure, and add some gain.

The down side of all preamplifiers is that their excessive gain can drive scanners into strong signal overload, causing intermodulation (hearing a signal in several different places) and desensitization (strong signals drive the scanner's automatic gain control – AGC – circuitry down making all signals weaker). And if the preamplifier itself is not well designed, it too can become overloaded and generate its own intermod products.

My guess is that on the lower frequencies (30-50 MHz) your preamp shows no improvement. That's because most scanners have good, low noise RF amplifier circuitry for the lower frequencies, and atmospheric noise is already above scanners' noise floor. But at increasingly higher frequencies, the atmospheric noise drops and receiving circuitry becomes noisier.

Use the best antenna you can, and good, low-loss coax as well, but if most of your signals are still very weak, then select a low-noise preamplifier; but no, don't put two in series!

Q. My garage door opener has a label saying that it must not emit harmful interference, but it must accept harmful interference. Why

is this? (Mark Burns, Terre Haute, IN)

A. Garage door openers are admitted under Part 15 (unlicensed devices) of the FCC rules and regulations. Since they are unlicensed, licensed users of shared frequencies have higher priority.

Q. Is there anything better than the transistor to replace transistors in radios? (Robert E. Brock, Phoenix, AZ)

A. While new technologies are always being explored, currently there seems to be nothing revolutionary looming on the horizon. The transistor has been shrunk to the point where millions of them can be put on a small integrated circuit (IC), so it would seem that size reduction of transistors will continue rather than a replacement technology for some time to come.

Q. Are there voice communications in the 108-118 MHz frequency range? (Robert E. Brock, Phoenix, AZ)

A. No. The only services authorized there are airport AM VHF Omni Range (VOR) and transcribed weather broadcasts (TWB). If you are hearing two-way land mobile communications, they are probably images produced by your scanner from the 150.8-174 MHz VHF FM high band.

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of MT, or e-mail to bgrove@grove-ent.com. (Please include your name and address.) The current Ask Bob is now online at our website: www.grove-ent.com

You could have a thousand dollar receiver, but it won't receive that weak or distant station if you have a poor antenna. In contrast, you can take an old, barely running scanner and it will bring in previously unheard stations if you have a great antenna. This month, we have some great ideas about improving your antenna situation. These ideas are for passive, receive only antennas.

6

Live in an apartment or condo? Often on the road in a hotel? Travel in an RV? Buy (or make) a length of RG58 with a BNC connection on one end. I bought a 20-footer with a BNC at both ends. I simply cut it in half. At the bare end, peel back the exterior black cover and the braid shielding for about two inches. Now cut off that outside plastic and shielding. Wrap a small piece of black electrical tape around the cut so that about two inches of the inner plastic and the center feedline are exposed. Cut off about half of the plastic insulator, making sure that there is no contact between the braid and the now bare center wire.

Find a screw in the middle of a vertical window frame. Back the screw out about a quarter of an inch. Bend the center feedline into a hook shape, attach it, and gently re-tighten the screw. The entire window frame just became your quad antenna. I then use a length of electrical tape to hold it in place down along the window frame for a foot or so. You can also try a sliding door frame. Look for any vertical metal application. It works really great in my motorhome. May be low tech, but it is also low visibility and I love stealth.

7

If you intend to be monitoring while on the water, you can use a standard VHF marine antenna. Mount it anywhere, the higher the better. DO NOT use this same antenna for transmitting. You need a separate receive only antenna for monitoring. If you live near the ocean, you can try mounting these marine antennas on your roof or balcony. Marine antennas are especially made to tolerate a salt water climate.

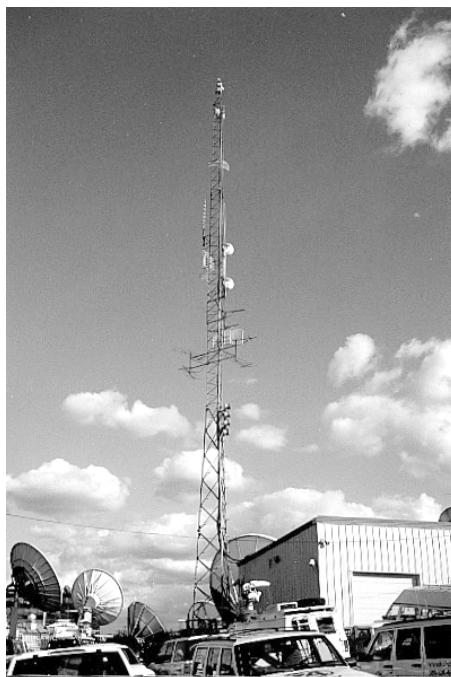
8

Find a creative location for a scanner mag-mount. Go outside, and look at the possibilities: the railing on your balcony, a metal overhang? Hint: it will

work upside down. Indoors, use a metal filing cabinet, desk, or cookie sheet. MFJ makes an "UltraLite" magnet mount antenna that is almost invisible. They are at 1-800-647-1800 or <http://www.mfjenterprises.com>.

9

Buy or build your own quarter wave ground plane, J-pole or discone antenna. There are many books and magazines with great antenna designs. Take a look in *QST*, or other ham magazines. Visit the ARRL at <http://www.arrl.org/shop>.



This antenna farm at a TV station represents big bucks! But for our readers, we have more thrifty ideas.

10

Outdoor antennas. You spent the big bucks for a great receiver or lots of little ones. Go all the way and consider a mast or tower. Naturally, the more extensive and complex involve many mast or tower sections. HF requirements are different from VHF and UHF. Personally, I prefer a tilt-up up with three 10 foot sections. On a hinged base, this mast can be easily handled by three or four people. Secured to the end of a roof line, this involves no guy

wires. See the small ads in the back of magazines *QST*, *CQ*, or *73*.

Safety first. If you will be installing a metal antenna outside, remember that it can be a very hazardous job. Have friends help you, and look out for electrical lines and other dangers. Sloped roofs and climbing trees are for agile and nimble youth. Climbing or installing towers is a very dangerous and specialized job. Make certain you have the necessary safety equipment and special skills to do it.

11

Many of us have a TV antenna left over from the pre-cable/satellite days. You can convert that old TV antenna by turning it 90 degrees to be vertical instead of horizontal. If you do this, you need to drill some new holes in the mast hardware to enable you to achieve the new angle. It becomes a yagi beam and favors reception in the direction you point it. Imagine what you can do with a rotor! (If you don't have an old TV antenna, they are fairly inexpensive to purchase. Or maybe your neighbor, or a relative has an old one.)

12

Covert antennas. If you live in a condo or apartment you might be restricted to what you can install for antenna. There are antennas disguised as roof vents, flagpoles and even artificial trees. Use your imagination and the search feature on your internet browsers to find such products.

13

Listen to the shortwave bands? Need a long wire antenna? Consider a stranded stainless-steel nylon-coated wire. It is made for beading and can be found in jewelry hobby/supply stores in spools up to 300 ft. It cannot be soldered, but when stripped it fits into a crimp style banana plug. Experiment! Go outside and walk around your home (or apartment building). Are there any safe locations you could mount an antenna or hang a wire dipole? What about hiding it in a tree?

Next month, we explore getting the most from the *2001 Police Call Books* and CD ROM. In April, we'll take a look at new ideas for your HT antenna. Stay tuned.

Public Safety in Lubbock Texas

The following tremendous report on the city of Lubbock was sent to us by the folks at <http://www.lubbockradio.net>. This is just the kind of detail that we love to see in *MT, Police Call*, and other publications. We'll also give you more details on the highly anticipated Bearcat 780XLT scanner. This month we'll focus on additional non-trunking features. But first, let's visit legendary Lubbock, Texas.

City of Lubbock, TX

EDACS trunked radio system (call sign: WPFW709)

FREQUENCIES LCN

1. 856.2375
2. 856.7375
3. 857.2375
4. 857.7375
5. 858.2375
6. 858.7375
7. 859.2375
8. 859.7375
9. 860.2375
10. 860.7375
11. 856.4875
12. 856.9875
13. 857.4875
14. 857.9875
15. 858.4875
16. 858.9875
17. 859.4875
18. 859.9875
19. 860.4875
20. 855.9875

TALKGROUP IDENTIFICATION

LPD-FLEET ALL-CALL
LPD-DISPATCH CH-1
LPD-ALTERNATE DISPATCH
LPD-SECONDARY
LPD-TLETS (RECORDS)
LPD-TALK-1
LPD-TALK-2
LPD-SUPERVISORS
LPD-TACTICAL-1/SWAT
LPD-TACTICAL-2/SWAT
LPD-ADMINISTRATION
LPD-TRAINING
LPD-COMMAND-1
LPD-COMMAND-2
LPD
LFD-CHANNEL-1 DISPATCH
LFD-CHANNEL-3
LFD-CHANNEL-7
LFD-CHANNEL-2
LFD-NEW-12/1999
LFD-CHANNEL-4
FMO-FIRE MARSHAL OFFICE
LFD BACKUP DISPATCHING RADIO
LFD STATION 1, 18TH/AVE K
LFD STATION 2, MUNICIPAL DR
LFD STATION 3, MILWAUKEE/25TH
LFD STATION 4, UNIVERSITY/COLGA
LFD STATION 5, ZENITH
LFD STATION 6, INDIANA/34TH

AFS

01-010
01-011
01-012
01-013
01-014
01-015
01-016
01-017
01-021
01-022
01-023
01-024
01-025
01-026
01-027
01-031
01-032
01-034
01-041
01-043
01-044
01-052
01-060
01-061
01-062
01-063
01-064
01-065
01-066

LFD STATION 7, SLIDE/3RD
LFD BACKUP DISPATCHING RADIO
LFD STATION 8, 50TH/AVE T
LFD STATION 9, 50TH/UTICA
LFD STATION 10, MLK BLVD
LFD STATION 11, AIRPORT
LFD STATION 12, 79TH/SLIDE
LFD STATION 14, 96TH/AVE X
LFD STATION 15, 80TH/VENITA
CITY MARSHALS COURT
EOC-EOC-1
EOC-EOC-2
EOC-EOC-3
LPD-SPECIAL EVENTS-1
LPD-SPECIAL EVENTS-2
LPD-SPECIAL EVENTS-3
LCSO COMM-1
LCSO COMM-2
STREETS-CREWS CH-1
STREETS-CREWS CH-2
STREETS-SURVEYING-1
STREETS-SURVEYING-2
LP&L-CH-1
LP&L-CH-2
LP&L-CH-3
LP&L-CH-4
LP&L-CH-5
LP&L-CH-6
LP&L-CH-7
LP&L-METER READERS
LBB-AIRPORT OPERATIONS
LBB-AIRPORT MAINTENANCE
LBB-AIRPORT GROUNDS
LBB-AIRPORT TALK-1
WATER-CH-1 DISPATCH
WATER-CH-2
WATER-CH-3 ENGINEERING
WATER-CH-4
WATER-CH-5
WATER-CH-6
WATER-CH-7
WATER-CH-8 RECLAMATION
WATER-CH-9
WATER-CH-10
WATER-CH-11 CONTROL
WATER-CH-12
DIGITAL MODULATION
FLEET SERVICES
RADIO SHOP
LUBBOCK CO SHERIFF
RADIO SHOP
RADIO SHOP
RADIO SHOP
WASTE-CH-1
WASTE-CH-2 LANDFILL
WASTE-CH-3
PARKS & REC CH-1
PARKS & REC CH-2
PARKS & REC CH-3
PARKS & REC CH-4
CITIBUS-1 PRIMARY
CITIBUS-2 DRS
CITIBUS-3 MAINTENANCE
CITIBUS-4
CITIBUS-TECH SHUTTLES
CIVIC CENTER 1
CIVIC CENTER 2
TRAFFIC ENGINEERING 1
TRAFFIC ENGINEERING 2
ANIMAL CONTROL 1
ANIMAL CONTROL 2
BLDG INSPECTORS
HEALTH DEPARTMENT

01-067
01-070
01-071
01-072
01-073
01-074
01-075
01-076
01-077
01-081
01-091
01-092
01-093
01-094
01-095
01-096
01-101
01-102
02-011
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02-105
02-111
02-112
02-121
02-122
02-131
02-132
02-133
02-141

LSD POLICE
LUBBOCK EMS-1 CITY
LUBBOCK EMS-2 COUNTY
LUBBOCK EMS-3 ALTERNATE
LUBBOCK EMS-4 UMC

03-011
03-021
03-022
03-023
03-024

Patches (see the Nov. BC-780 article for an explanation of patches)
EMS-ST.MARY'S PATCH 15-126
HOSPITAL PATCH 15-127
HOSPITAL PATCH 15-130
AERO CARE PATCH 15-157
(Note: additional information including decimal codes can be found on the listed web site.)

Lubbock Police Department Unit Numbers

Unit No.	Description
100's	Day Shift Patrol
100	Day Shift Captain
101	Day Shift Lieutenant
1x0's	Day Shift Sergeants
200's	Evening Shift Patrol
200	Evening Shift Captain
201	Evening Shift Lieutenant
2x0's	Evening Shift Sergeants
390's	K-9 Patrol
400's	Night Shift Patrol
400	Night Shift Captain
401	Night Shift Lieutenant
4x0's	Night Shift Sergeants
500's	Traffic Units
501	Traffic Lieutenant
510	Traffic Sergeant
512-519	Motorcycle Traffic Units
520	Motorcycle Sergeant
540's	Parking Enforcement
591	Public Information Officer
599	Patrol Colonel
600's	Property Crimes
700's	Persons Crimes / Juvenile
800's	Special Operations
900's	Administration and Training
950	Chief
999	Administration Colonel
5E1	Emergency Operations Center
5M1x	City Marshals
5M80's	Texas Alcoholic Beverage Commission Officers
9M50's	South Plains Mall Security (off-duty PD)
Hotel	Mounted Patrol (Horse)
Tango	Traffic Units
Victor	Victims Assistance
5L + #	LSD Police

Lubbock Fire Department Apparatus

Station	Location	Engine	Truck
Station 1*	18th and Ave. K	Engine 1	Truck 1
Station 2	Municipal Dr.	Engine 2	
Station 3	Milwaukee & 25th	Engine 3	Brush 3
Station 4	Univ. & Colgate	Engine 4	Truck 4 Hazmat 4
Station 5	Zenith	Engine 5	Brush 5
Station 6	Indiana and 34th	Engine 6	
Station 7	Slide and 3rd	Engine 7	
Station 8	50th and Ave. T	Engine 8	
Station 9*	50th and Utica	Engine 9	
Station 10*	MLK Blvd.	Engine 10	
Station 11*	Airport		
Station 12	79th and Slide	Engine 12	Truck 12 Hvy Rescue 12
Station 14	96th and Ave. X	Engine 14	Scuba 14
Station 15	80th and Venita	Engine 15	Tanker 1 & 2

Bearcat 780 Update – Part 3

In part 3 of this series on the highly anticipated Bearcat 780XLT scanner, we continue our focus on non-trunking functions begun last month. In October we began by covering the 780's remarkable Ericsson trunktracking capabilities, and next month we'll wrap up the series with a look at Motorola trunktracking.

SEARCH OPERATION (Conventional Search)

You can program up to 10 search ranges in the BC-780. Once you begin searching, you can link the ranges together and turn them on and off just as you would turn on and off scan banks (this is known in Uniden-lingo as "Chain Search"). You can also change the search direction by pressing and holding (for two seconds) the up and down arrows. There is also a "Search Event Menu" in which you can set a multitude of parameters for each search range:

Step: Adjust the step size within the range, including the options of 5kHz, 10 kHz, 7.5 kHz, 12.5 kHz, 25 kHz, 100 kHz, Auto (default)

Mode: Change the mode (AM, FM, NFM, WFM)

Alpha Tag: Set an alpha tag (up to 16 characters) for the search range, such as "Lo Band Military"

You can also set additional parameters which will apply to all search ranges:

Delay: Just as you do for channels, you can set up to 8 levels of delay per search range, including: No delay, 1 second, 2 seconds, 4 seconds, -2 seconds, -5 seconds, -10 seconds, Infinite. The default setting is a two-second delay.

Note that the negative (or inverse) delays will allow you to hear snippets of conversation (such as 5 seconds of a transmission) before the scanner will resume scanning,

even if that transmission is continuing. This works well for search when you might just be interested in a sampling of what's happening within a range. An infinite delay means that the scanner will stop on any transmission (or squelch opening) and will hold there until the user resumes the search with a key press.

Attenuator: You can turn attenuation on for search ranges (20dB, we believe).

Tone Data: Using the system menu, you set whether you want the scanner to be in tone squelch or tone search mode. With tone search on, as soon as the scanner stops on any transmission during a search, it will begin looking for any CTCSS or DCS (digital) sub-audible tone. If a DCS tone is present, it will generally be found instantly. If a CTCSS tone is used, the scanner will check each of 38 possible tones until the correct tone is found. This is not as slick as the PRO-92 and PRO-2067 which find these tones instantly.

Tone Squelch in Search mode is where the 780 really shines. You can set the search ranges to only stop on transmissions with a CTCSS of 167.9, for example. One tone setting will apply to all search ranges. Additionally, you can do just the opposite by using Tone Lock (wasn't that once a rock band?) mode. In Tone Lock, you will be able to monitor all transmissions EXCEPT those with a tone of, for example, digital 023. (Note: You can also do this in standard channel programming.)

Record: You can flag all transmissions monitored in Search to be recorded via the tape-out jack.

Auto Store: Automatically program a bank with search hits if you desire.

Note: The very first time you set a range for a bank you must set the range through the Menu. After that, you can change the prescribed search range through the keyboard just as you would on any other scanner (or you can do it again in the Menu).

◆ DISPLAY

The large, backlit display on the BC-780 has a number of interesting features:

Two Lines of alpha (16 characters each): One line for Bank tags, Scan List Tags, and Search Range tags; One line for talkgroup and frequency tags. Both text lines will also display Menu items when required. The top alpha line will also display numeric talkgroup IDs.

Signal Strength Meter: six graduated signal strength bars

Frequency, mode, and talkgroup/subaudible characters: This portion of the display shows frequency (in large 7-segment characters) as well as the mode (in icons) and the sub-audible tone or talkgroup ID. Unlike other scanners which will only display a talkgroup number or a frequency in trunking mode, the 780 will show frequency and talkgroup (and your alpha text for the talkgroup can also display). In other words, while in trunking, you see every possible indicator. The talkgroup characters are used to display any subaudible tone that may be active in non-trunk mode.

Trunking repeater activity indicators: Unique to Uniden, these 30 small bars provide a great visual of repeater activity in a trunked system.

Channel/Scan List/Bank Characters: The

top left, medium-sized, 7-segment characters can display the active channel number (1-500), or, while in trunking mode, they can display the currently active Scan List and Scan List memory position, or the currently active bank. The user chooses which to display with the Select key.

Trunk Type Indicators: An L (for LTR), E (for Ericsson/EDACS), or an M (Motorola) will display for trunked systems based on the user setting.

Other: The other standard icon indicators such as Bank numbers (1-10), Search, Scan, RMT, etc.

◆ RS-232 INTERFACE

There are a multitude of uses for the RS-232 interface. Unlike most scanners, the BC-780 provides a standard DB-9 serial connection on the back of the radio. A simple serial cable is all you need to connect the 780 to a PC (these cables are available at most every office supply, electronics and computer store for just a few dollars).

Computer Programming: Like many other high-end scanners, you can program the 780 with external software or back-up what you have programmed into software. With 500 channels, 1000 talkgroups, 16 characters of alpha for each, and much more, this is an extremely useful feature.

Computer Control: The 780 is also fully computer-controllable. All aspects of the 780 can be controlled by remote software. Best of all, you can leave the 780 in remote mode and use either software or the keys on the scanner itself! It's fully bi-directional. Under computer control

all keys and the VFO on the 780 are operational!

Software from the folks at WinScan will be available for programming and control of the 780 shortly after its release (it runs at speeds up to 19.2kbps). The software will be available from Scanner Master and other dealers.

Cloning: With an adapter and two serial cables you can connect two 780s and clone the programming of one directly to another. Unfortunately you cannot clone with a BC-245, BC-895 or any GRE scanner.

SmartScanner: You can download frequencies, talkgroups, and alpha tags from Uniden's SmartScanner server via a phone line and modem connection.

◆ LTR TRUNKING

We are not very familiar with the operation of this aspect of the BC-780XLT, but you can trunk a Johnson LTR system. You can program IDs and scan them or search for IDs. The operation is slightly different than for Motorola and Ericsson trunking as LTR does not use a control channel but rather a subaudible method for operation.

More next month....

◆ Wrapping Up

After many years of writing the scanner column for *Monitoring Times* I will be stepping down in a few months. If you've been considering sending me material for future columns, I hope you'll do so right away. If I don't get a chance to use it, I'm sure the next editor will. Thanks very much for your support.

TrunkTrac®

New Version 5.2



TrunkTrac, the first, and one of the most sophisticated trunk tracking technologies available, is now even better. New pricing and additional features make TrunkTrac your best choice if you're serious about tracking Motorola Type I, II, III, and Hybrid systems. TrunkTrac now supports the BC895XLT, PCR1000, R7000, R7100, R8500, R9000, and the RS Pro 20xx series with an OS456/535 board installed.

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US Air Force ISB is Back

Last month we noted how the weather transmissions from the United States Air Force had been tentatively spotted on 11120 kilohertz (kHz), in straight Baudot radioteletype (RTTY). This turned out to be for real. Better yet, there's now a parallel on 3231 kHz. Both of these strong, authoritative signals use 850-hertz shift and 75-baud speed. Depending on how your radio tunes RTTY, you might find them as much as 2.8 kHz away from these assigned carrier frequencies.

It gets even better. Both frequencies are independent sideband emission (ISB), and simultaneously carry the Air Force weather fax, bringing this interesting service to seven known frequencies. These are 3231, 4855, 7398, 7870, 11120, 17781, and 19363 kHz. Set your radio to upper sideband (USB), and in most cases tune a dial frequency 1.9 kHz lower. This fax is silent much of the hour, but often seems to get busy around 55 minutes after.

For the RTTY, use lower sideband (LSB) mode to get on-frequency, because this is how it is broadcast. The US military has done a lot of ISB in the past, and it's kind of a neat system. It's based on the technical nature of any suppressed-carrier modulation, where most output is in one or both of the modulation sidebands, around 1.5 kHz from the assigned frequency. Single sideband is most common, due to its great efficiency, but as we see here, it's perfectly possible to transmit both (double sideband), or even separate audio in each (ISB).

3231 and 11120 are usually parallel to each other, but not to the older, RTTY-only system on 7784 and 13530. The weather products are the same, but this other broadcast uses different transmitters and schedules and tends to be quiet for longer periods of time.

Some other agencies, such as Canadian Forces in Halifax, Nova Scotia, actually alternate RTTY and FAX on the same channel frequencies. This takes some quick retuning, so I doubled up on memories for these guys. You'll find CFH going strong in both modes, FAX on the hour and RTTY in the time left over, on or about their assigned frequencies of 4271, 6496.4, 10536, and 13510 kHz.

English Lady is Cuban?!

For years, everyone's wondered where The English Lady comes from. This name is kind of confusing, referring to the language of the bizarre sounding "numbers" broadcast, not to its country of origin. "She" is actually from Russia, as far as anyone knows. She's been designated E17 on the "official" list maintained by ENIGMA, the European Numbers Intelligence Gathering and Monitoring Association. This group is very much alive, even though it has stopped publishing its newsletter.

Problem is that the English Lady signal, beamed to the US in the early evening, is way too strong to come from Russia's hemisphere. Cuba and Central America have long been suspected.



John Maky, who does a lot of numbers listening, recently found E17 on the same transmitter as the Cuban Morse code numbers (M8), both going simultaneously on 4520 kHz at 0300. This is possible because the Morse is most likely on-off keyed by sending audio tones to special circuits in the exciter sections of Cuba's powerful broadcast transmitters. This audio has also been heard mixed with their voice numbers lady, the "Atencion!" station (V2). Well, it looks as if someone pushed the wrong button again, and now we know the English Lady is Cuban.

What Was THAT?!

Everyone's noticing a huge increase in the funny noises on HF. Suddenly, new technologies are spawning faster than insects in spring-

time. Sometimes, especially at night, it sounds as if the buzzes, beeps, and blips have taken over. Everyone wonders what these are. Speculation flies thicker than the noise itself. Radar? Propagation sounding? Research? Military?

Right at press time, we nailed one of these. It's the Ticking Clock Station, which sweeps a pulsing carrier downward across 25 or so kilohertz exactly once per second. This turned out to be an experimental radar system in New Jersey, set up to measure ocean currents. We wouldn't even know this much, had its unwanted third harmonic not been sweeping 14275 to 14350 kHz, also known as the busy end of 20-meter amateur! We hams don't like funny noises in our bands, unless we're making them, and the Federal Communications Commission got on it pretty fast. A better filter has been installed on the thing, and the fundamental has been shifted down to around 4375-4400 kHz, where it can still often be heard ticking away.

Then there's the 007 Station. This has nothing to do with James Bond, but its designers must like the number seven. At 7 and 37 minutes after each hour, it hits 3007 kHz with short data bursts from two different transmitters. It then proceeds to hit 4007, 5007, and so on, in 10-second intervals, clear to 29007 kHz. Yet another propagation sounder? Don't ask me!

Weirdest of the lot, though, is a continuous electronic bleat from somewhere in Asia, which comes and goes with the skip on 6417, 6445, 8588, and 8703.5 kHz USB. All four frequencies are in perfect sync. They do a weird, phase-noisy thump eleven times a second, while simultaneously repeating a relentless little song of sequential data tones. This tune stops every few minutes for some hissy databursts. Nobody has the slightest idea what all this is doing.

Adding to the HF chorus is the Razzer, a surface-wave radar made by Raytheon, which emits a truly nasty buzz. There's the Woodpecker, another oldie making a comeback, though this time as a far less obnoxious auroral radar. There are Throb, Stream, and Hell, all amateur direct-printing modes. And so it goes, into the new century. Guess HF isn't obsolete after all.

ABBREVIATIONS USED IN THIS COLUMN

ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARQ	Automatic Repeat Request teleprinting system
CAMSLANT	Communications Area Master Station, Atlantic
CG	Coast Guard
CW	Continuous Wave (Morse telegraphy)
DE	From
DEA	Drug Enforcement Agency
DX	Distant Transmitter
E3	Enigma classification: Lincolnshire Poacher
E4	Enigma classification: Cherry Ripe
E10	Enigma classification: phonetic alphabet - NATO designators (Mossad)
E17	Enigma classification: English Lady - aka The Russian Man, ends 0000
EAM	Emergency Action Message
FAX	Radiofacsimile
FEC	Forward Error Correction teleprinting system
FEMA	Federal Emergency Management Agency
FM	Frequency Modulation
ID	Identifier
LDOC	Long Distance Operational Control
M8	Enigma classification: Cut numbers - ends AR ARAR SK SKSKSK (Cuba)
M22	Enigma classification: 4XZ
MARS	Military Affiliate Radio System
MFA	Ministry of Foreign Affairs
MWARA	Major World Air Route Area
NATO	North Atlantic Treaty Organization
PacTOR	Packet Teleprinting Over Radio
RAF	Royal Air Force
RSA	Republic of South Africa
RTTY	Radio Teletype
S17	Enigma classification: Czech Lady control 5FG
SAM	Special Air Mission
SESEF	Ship Electronics Systems Evaluation Facility
SHARES	Shared Resources
SITOR	Simplex Teleprinting Over Radio (modes A & B)
UK	United Kingdom
Unid	Unidentified
US	United States
V2	Enigma classification: Spanish Lady - (3 messages, all 150 count)
VHF	Very High Frequency

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations (encrypted, usually unidentified, broadcasts thought to be intelligence-related) are identified in () with their ENIGMA station designators, as issued by the European Numbers Intelligence Gathering and Monitoring Association.

- 1752.0 EJK-Valentia Radio, Ireland, weather info and then a phone patch with an unknown aircraft, at 2034. (Patrice Privat-France)
- 2852.0 MGIL-British-sounding callsign repeated every 20 seconds in CW, no other traffic, for 30 minutes beginning at 2300. (Geoff Halligey-UK)
- 3208.0 RMP-Russian Navy, Kaliningrad, working vessel RZXW in CW, at 1957. (Ary Boender-Netherlands)
- 3231.0 KGWC-International weather circuit ID for US Air Force Global Weather Center, with FAX charts in the upper sideband, at 0523. KAWN-Weather ID for US Air Force Aviation Weather Network (main switch at Tinker AFB, OK), with RTTY weather

- codes in the lower sideband of the same transmitter, also at 0523. (Mid-Atlantic DXer-MD) [Yup; US Air Force independent-sideband weather is back, and the two older RTTY freqs are still going too. -Hugh]
- 3415.0 ART-Israeli Intelligence (E10), with AM callup and "numbers," parallel on 5434, at 2030. (Boender-Netherlands)
- 3652.0 GYA-British Royal Navy, Northwood, with a smeary FAX weather chart, at 2320. (Day Watson-UK)
- 3855.0 DDH3-Hamburg Meteorological, Germany, with a FAX upper air chart, at 0641. (Watson-UK)
- 3963.0 V84W-Unidentified Russian station, with CW callup to AOXD, then 5-letter code groups in Cyrillic Morse, at 2120. (Boender-Netherlands)
- 4026.0 Cuban "cut" number station (M8), with 5-number CW groups, Friday at 0302. (Camillo Castillo-Panama)
- 4027.0 Cuban "Atencion" number station (V2), with Spanish 5-number groups in AM, Saturday at 0302. (Castillo-Panama)
- 4241.0 LGW-Rogaland Radio, Norway, in CW farewell message, final sign-off at 0002. (Watson-UK)
- 4721.0 Trout 99-US Air Force, in a patch to command post via Andrews, reported that an Air Force Chief of Staff was aboard, at 0533. (MADX-MD)
- 4742.0 Architect-British Royal Air Force Flight Watch Centre, working "Skywatch" at 0240. (Ron Perron-MD)
- 4848.0 "6-W-J"-Probable US military exercise, with 2 EAMs at 0048. (Jeff Haverlah-TX)
- 5399.6 Unid-Probably US Coast Guard GANTSEC (Greater Antilles Section), with "whale sounds" and possible drug interdiction in secure voice, identical to the more commonly heard 6815.6 frequency, at 0644. (Hugh Stegman-CA)
- 5598.0 Martinique 912-Commercial flight cleared by New York Radio out of flight level-350 for 340 at 0544. (MADX-MD)
- 5680.0 "9-W-L"-Probable US military exercise, with EAM, then "B-4-Y," with three special "EAM sequences" at 0622. (Haverlah-TX)
- 5696.0 Coast Guard Rescue 6003-US Coast Guard, with a patch via CAMSLANT to CG Group Mayport, at 0700. CG Rescue 6003, breaking off a later search and returning with an in-flight emergency for a bad left side engine, at 1530. (Allan Stern-FL)
- 5717.0 Tusker 44-Canadian rescue CC-130H, in a patch via Halifax Military to the Rescue Coordination Centre, in search of an overdue fishing boat, at 2351. (Perron-MD)
- 5841.0 Panther-US DEA, Bahamas, working Coast Guard 32C at 0356. (Perron-MD)
- 6316.0 UFN-Novorossiysk Radio, Russia, working vessel UDEW, Akademik Poustovoit, Sitor-A, at 1554. (Watson-UK)
- 6319.5 UCE-Arkhangelsk Radio, Russia, working vessel UCOZ, Maekhanik Semakov, Sitor-A, at 1559. (Watson-UK)
- 6379.0 4XZ-Israel Navy, Haifa, with encrypted CW traffic, then back to usual "VVV DE 4XZ" marker, at 1924. (Watson-UK)
- 6501.0 CAMSLANT Chesapeake-US Coast Guard, working "Z-4-I," probably a cutter, at 0625. (MADX-MD)
- 6666.0 "9-A-L"-Probable US military exercise, with EAM at 0151. (Haverlah-TX)
- 6683.0 SAM 201-US Air Force VIP flight, a C-20B, in a patch via Andrews to SAM Command Post at 2221. (Perron-MD)
- 6697.0 "5-L-D"-NATO trigraph callsign for unknown aircraft working MKL, British Royal Air Force, Northwood, at 2158. (Perron-MD)
- 6739.0 Ascot 5052- Royal Air Force, working Architect at 0645. (Perron-MD)
- 6768.0 Cuban "cut" number station (M8), 5-number CW groups for GMIWD MNRIN DTNND at 1302. (Castillo-Panama)
- 6780.0 Unid-Weird male voice in English, giving numbers in 5-digit groups at 2116. (Gary Cohen-MA) [Probably Russian. -Hugh]
- 6784.0 Cuban "cut" number station (M8), 5-number CW groups at 1301. (Castillo-Panama)
- 6824.0 Cuban "cut" number station (M8), 5-number CW groups for GMIWD MNRIN DTNND at 1301. (Castillo-Panama)
- 6854.0 Cuban "Atencion" number station (V2), with Spanish 5-number groups in AM, at 0305. (Castillo-Panama)
- 6900.0 Lincolnshire Poacher (E3), British intelligence, Cyprus, with

- 6933.0 "numbers" in progress at 2016. (Boender-Netherlands)
Cuban "cut" number station (M8), 5-number CW groups for RRAMI MUINN DRMGIT at 1203. (Castillo-Panama)
- 6959.0 Lincolnshire Poacher (E3)-British intelligence, Cyprus, with female callup to 39221 and 5-figure groups, then usual 45-minute cycle, on at 2000, gone at 2045. (Sean-VA)
- 6960.0 Lincolnshire Poacher (E3), with female callup to 44250 at 2107, then a new message at 2200. (Cohen-MA)
- 6987.0 Unid-Weird English-speaking female voice (E17) with 5-figure "numbers" groups at 0411. (Castillo-Panama) [Russian, though not necessarily transmitted from there. -Hugh]
- 7535.0 SESEF-US Navy Ship Electronic Systems Evaluation Facility, Norfolk, VA, working destroyer USS Oscar Austin (DDG-79), at 1545. (MADX-MD)
- 7554.0 Cuban "Atencion" number station (V2), with Spanish 5-number groups in AM, at 0315. (Castillo-Panama)
- 7710.0 VFF-Canadian Coast Guard, Iqaluit, with FAX ice charts at 0530. (MADX-MD)
- 8127.0 VLB2-Israeli intelligence (E10a), with female phonetic callup, null message, at 0247. (Castillo-Panama)
- 8157.0 The English Lady-Bizarre Russian AM "numbers" voice (E17), repeating 5-figure groups in English, signed with "00000" at 0324. (MADX-MD)
- 8190.0 Unid Czech "numbers" (S17c), callup to 92034 in AM at 1250. (Boender-Netherlands)
- 8367.0 FUE-Third harmonic from 2789 kHz, of French Navy, Brest, with 75-baud RTTY, but shift of 2550 hertz (3x850), repeating the usual test markers at 1140. (Watson-UK)
- 8437.0 4XZ-Israeli Navy, Haifa (M22), with CW marker at 0243. (Castillo-Panama)
- 8677.0 CBV-Valparaiso Radio, Playa Ancha, Chile, with fuzzy FAX weather charts at 2323 and 2336. (Watson-UK)
- 8715.0 UMF-Odessa Radio, Russia, working STB (Dry Transport Barge) *Dinenko* in CW, at 0350. (MADX-MD)
- 8825.0 New York Radio, MWARA North Atlantic net, taking position from US Air Mobility Command Reach 785T, went to 11309 and kept this one as secondary, at 0135. (Perron-MD)
- 8889.0 Unid French fishing trawlers in the Atlantic, discussing problems with video cassette recorders, at 1030. (Privat-France)
- 8971.0 Blue Star-US Navy, PR, working Hunter 02, probably British RAF on joint drug ops, given a coded frequency for US Coast Guard, at 0315 Molson 713-Canadian Forces aircraft, working Fiddle (US Navy, Jacksonville, FL), at 2059. (Perron-MD)
- 8974.0 Lince 12-Probable Spanish Air Force aircraft, working unid ground station at 2150. (Perron-MD)
- 8983.0 CAMSLANT Chesapeake-US Coast Guard, VA, working Rescue 6033 in a search, at 2130. Camslant working "T-4-G," a drug mission, at 2159. CAMSLANT sending "Q-3-B" to another frequency for Panther (DEA, Bahamas), at 2302. (Perron-MD)
- 9031.0 Ascot 3201-British Royal Air Force aircraft, working Architect (RAF Flight Watch Centre), at 0305. (Perron-MD)
- 9215.0 Unid CW station with callup to 792, then 5-figure "numbers," at 0231. (Castillo-Panama) [Again, most likely Russian. -Hugh]
- 10066.0 Calcutta Aero, India, working Lauda 20, position check, at 1815. (Privat-France)
- 10215.0 Cuban "cut" number station (M8), 5-number CW groups at 0903. (Castillo-Panama)
- 10493.0 WGY 908-FEMA Region 8, Denver, radio troubleshooting at 0059. (Perron-MD)
- 10536.5 CFH-Canadian Forces, Halifax, Nova Scotia, with clear FAX weather charts at 0535. (Bob Hall-RSA)
- 10581.0 S84-Swedish Embassy, Washington, DC, with 2400-baud serial modem traffic to S94, Mexico City, after ALE callup, at 0819. (MADX-MD)
- 10608.0 Turbo-Colombian Coast Guard, working Atlantico, probably the naval headquarters, at 2311. (MADX-MD)
- 10780.0 Cape Radio-US Air Force, telling King 2 that the space shuttle launch would be using 5180 kHz, at 0132. (Perron-MD)
- 10806.5 Unid-Male working "Zodiac," said he was alone until after "NBC," at 2046. (Duke Rumley-NC)
- 10917.7 RFFXOC-French Ministry of Defense, with long ARQ messages in 5-letter code groups, at 1600. (Hall-RSA)
- 11120.0 KGWC-US Air Force Global Weather Center, with FAX charts in the upper sideband, at 0405. KAWN-US Air Force Aviation Weather Network, with RTTY weather codes in the lower sideband of the same transmitter, at 0409. (MADX-MD) [Like 3231. -Hugh]
- 11175.0 Razor 22-US military aircraft, calling Mainsail (any station), no joy at 1650. (Haverlah-TX)
- 11235.0 Lince 12-Probable Spanish Air Force aircraft, working unid ground station, called this frequency "Bravo 3," at 2150. (Perron-MD)
- 11366.0 Unid-Ground station working "flight 23," in Portuguese, probably a Varig airlines LDOC, at 2331. (Perron-MD)
- 11637.0 FAAZFW-US Federal Aviation Agency, Fort Worth, TX, sounding in ALE at 0651. (MADX-MD)
- 12226.0 S00-Swedish MFA, Stockholm, with ALE call to S73, Lagos, at 0131. (MADX-MD)
- 12478.0 UCMR-Russian vessel *Ivan Shadr*, working Arkhangelsk in Sitor-A, no traffic, at 1217. (Watson-UK)
- 12590.5 RRR34-Moscow Radio, Russia, with traffic list in Sitor-B at 1445. (Watson-UK)
- 12666.5 RFFME-French Navy, possibly Toulouse, testing in RTTY at 2050. (Hall-RSA)
- 12710.7 PWZ33-Brazilian Navy, Rio de Janeiro, with RTTY (850/75) weather at 0530. (Hall-RSA)
- 13244.2 NNNNOELA-US Navy/Marine Corps MARS, in a SHARES exercise with net control station AFA3HY, sending PactOR messages (200/100), at 1839. (MADX-MD)
- 13257.0 Gonzo 4-Canadian Forces aircraft, calling Trenton Military, at 1715. (Perron-MD)
- 13392.0 DFZG-Serbian MFA, Belgrade, with RTTY (400/75) testing and then encrypted traffic, at 0656. (MADX-MD)
- 13530.0 Barranca-Colombian, Barrancabermeja, with ALE call to unknown Navy unit "Radgenabu," at 1642. Pesima-Unknown Colombian military, working Cotari in ALE, at 1704. (MADX-MD)
- 14404.0 S86-Swedish Embassy, Mexico City, with 2400-baud serial modem traffic to S91, Lima, Peru, after ALE callup, at 0640. (MADX-MD)
- 14982.5 RBV76-Tashkent Meteorological, Russia, with a very clear FAX weather chart, at 1520. (Hall-RSA)
- 15860.0 S00-ALE identifier of Swedish MFA, Stockholm, calling S31, Algiers, S45, Ankara, and S97, at 1400. (Watson-UK)
- 15973.0 SNN299-Polish MFA Warsaw, with ARQ traffic in Polish, then economic and cultural bulletins in English, then encrypted traffic for Baghdad, at 1502. (Watson-UK)
- 16344.4 Unid-Possibly Romanian MFA, using Romanian FEC mode for encrypted traffic, new frequency for this one, at 0641. (Hall-RSA)
- 16692.5 ZSC-Capetown Radio, with FEC weather bulletins, parallel on 4214 and 12601, at 0945. (Hall-RSA)
- 16840.5 8PO-Globe Wireless Barbados digital node, with channel marker at 2325. (Rumley-NC)
- 16903.0 MTF-British Royal Navy, Falklands, with RTTY (200/75) channel bulletins at 0745. (Hall-RSA)
- 16984.0 PWZ33-Brazilian Navy, Rio de Janeiro, with fast (850/200) RTTY news and weather in Portuguese, then weather in international code, at 2004. (Watson-UK)
- 17934.0 Boyeros-Cubana Airlines LDOC, working unid aircraft in Spanish, at 1639. (Perron-MD)
- 18560.0 BMF-Taipai Meteorological, with Chinese FAX weather charts at 0936. (Watson-UK)
- 18864.0 Cherry Ripe (E4)-British Intelligence, Pacific, parallel on 21866, with numbers at 0000 and 2300. (John Maky-AR)
- 19131.0 Atlas-US DEA, IA, working aircraft Flint 911 at 2133. (Perron-MD)
- 21866.0 Cherry Ripe (E4)-British Intelligence, Pacific, with numbers at 0000, 0100, and 2300. (Maky-AR)
- 22380.5 CBV-Valparaiso Radio, Chile, working several vessels in Sitor-A, at 1859. (Watson-UK)
- 22408.5 UFL-Vladivostok Radio, Russia, working vessel UHVL in Sitor-A, at 0857. (Watson-UK)
- 22818.5 EAE220-Spanish MFA, Madrid, with many encrypted Twinplex messages to Luanda, at 0858. (Watson-UK)
- 22863.0 Unid-Fast coded RTTY (500/100) from FAPSI, the Russian security and communication agency, at 0920. (Hall-RSA)
- 23370.0 HZN50-Jeddah Meteorological, Saudi Arabia, with RTTY (850/100) weather codes at 0914. (Hall-RSA)
- 23526.0 S84-Swedish Embassy, Washington, DC, with 2400-baud serial modem traffic to S93, Havana, after ALE callup, then same process with S94 (Guatemala) and S12 (Bogota), started at 1904. (MADX-MD)
- 24644.0 Cherry Ripe (E4)-British Intelligence, Pacific, with numbers at 2200. (Maky-AR)
- 25040.0 RFGW-French MFA, Paris, with coded messages in FEC, at 1529. (Hall-RSA)
- 26441.7 RFGW-French MFA, Paris with ARQ message to RFVIT (Navy, St. Denis), at 1245. (Hall-RSA)
- 26952.0 RFTJE-French Navy, Dakar, Senegal, testing in RTTY (850/75), at 0820. (Hall-RSA)
- 36500.0 Unid-Mexican Spanish-speaking FM male, as rebroadcast by a probable US military VHF repeater in WA, all afternoon starting at 2100. (Flash Parlino-WA)

Algerian Oil & Gas on HF

A few months ago, we described the techniques we used to identify the organization behind some pretty interesting ALE identifiers – the Washington Gas Light Company.

Our starter for this month's Digital DXing is in a similar vein, and serves as a great case study in the combination of intuition, detective research and some luck in getting to the bottom of an unknown ALE network ... Not to mention the ability to crack open another network and to gain insights into a far away country that one might otherwise never have known.

Since we cannot hear either of the networks in question here at "DD Towers," it's also a great example of the fun you can have even if all you have to go on is other people's frequencies and IDs.

◆ In the Beginning

Almost a year ago, a number of WUN listeners reported one, and then more frequencies carrying the same odd identifiers – GASSI30P, OHT30P, SP4, SP328, INAS30P, RNOUSLR1, and DEBDEB30P to name a few.

The speculation at the time was that this was some sort of net connected with UN peacekeeping operations in ex-Yugoslavia. The logic followed was that a number of the identifiers looked like ITU callsigns – SP for Poland, OH for Finland, DE for Germany, and so on. This was plausible since we also knew that most of these countries had provided detachments to the efforts in the Balkans.

Most people were satisfied with this explanation, and apart from yet more frequencies coming to light over the next month or so (see this month's International ALE Networks feature for more information) this is how things stayed for a while.

◆ It Gets Interesting

A few months ago, WUN contributor "RGA" made the observation that a number of the identifiers on this network had some similarities with another network. This one sported addresses such as ALG, ALR, OHT, BORMA, INA, HAMRA, RNS and TFT.

Since some of these identifiers appeared to be place names, and working on the hunch

that ALG was Algiers, RGA placed some bets on the other locations – ALR could be Ali bel Rida, OHT was probably Ohanet, and INA was probably In Amenas. Because the overlap of identifiers was quite large, RGA speculated that the origin of the other net was Algerian, too. We also knew that in one of the networks, ALE triggered Racal HSM-1250 modem traffic, which was also being phased into the Algerian Diplomatic operations on HF. All in all, this was some pretty good detective work.

Unfortunately, and as is often the case in utility listening of this nature, since we knew that this was not the MFA (their ALE network was already well-known), and was probably not military, the good-old MOI (Ministries of the Interior) designation came to the rescue.

◆ MOI - More Observation & Investigation?

Unsatisfied with the MOI designation for our two Algerian networks, we dug a little deeper into the subject.

First, we plugged all the ALE IDs into a good search engine on the web. This sounds laughable, but you'd be amazed by what's indexed on the web these days. Unfortunately, this method yielded no result.

Secondly, we looked at the place names suggested by RGA. Hassi el Gassi, it was speculated, might be the location of the station with identifiers GASSI30P and GASSIGPL. Looking at the atlas, we noticed that "hassi" is Arabic for "well." At first, we wondered about water wells or oases, but pretty quickly realized that these wells were probably of the famous black liquid variety – little did we know that we had struck oil!

◆ Black Gold

Entering the search terms "algeria AND oil" took us into a world we had little knowledge of before embarking on this investigation. Following a few links quickly took us to the website of SONATRACH – the Algerian government's oil & gas company.

Clearly proud of their country's extensive fields of oil and natural gas, and the infrastructure that they had developed to extract, store, process and transport it, we were pleased to find that SONATRACH had produced a beautiful

map showing the locations of everything. Of course, most of these places don't exist in regular atlases, either paper or on-line.

From then on, it was the usual painstaking process of checking each of the oil and gas field names for correspondence with the ALE identifiers. Although there are still a few unknowns, this process pretty much yielded all the ALE identifiers in our previously-designated UN peacekeeping net, plus refined most of the IDs put forward by RGA in his analysis of the second network.

What we haven't determined, precisely, is the meaning of some of the identifier suffixes and prefixes (SP and 30P) and whether the networks are security or operations-related. Unfortunately, there appears to be little traffic on the networks to help us in this regard.

You can see the full results of our investigation in this month's feature article. Hopefully this article will inspire you to work on some of the unidentified networks we've covered!

◆ Spanish Diplomatic Service

Here's a reminder that you can provide your TWINPLEX module with a handy workout by listening for MFA Madrid and its various South and Central American embassies. Telex and 10 letter-group encrypted messages are to be heard most days on 15946.5 and 22818.5 kHz. Selcals used are in the TQxx-series.

Remember to set the module for the -200/-85/+85/-200Hz tone shifts, word interleave and F7B-1 tone arrangement used. Failure to do so will result in garbled text.

◆ North Korean News Agency KCNA

One of the few press services still on HF, KCNA continues to transmit new from Pyongyang. The station uses Baudot at 50bd with a shift of 250 or 400 Hz. The current English schedule is as follows:

Target Area	UTC	Callsigns	Frequencies (kHz)
Asia	1000-1200	HMF46 & 86	8152 & 10580
Europe	1000-1200	HMF26 & 55	11430 & 15633
Americas	1230-1430	HMF36 & 52	11476 & 13580
Africa	1230-1430	HMF49 & 85	8020 & 11536

Until next time, enjoy the 1's and 0's.

Soviet Superpower Tests Burned the Ionosphere

In the late 70s, experiments were performed from Ukraine using 3 x 1000 kW transmitters in parallel. The antenna consisted of 13 vertical towers in the shape of a parabola (as viewed from an airplane) with various folded dipoles strung between all these towers. It also had a very narrow bandwidth (approx. 3 MHz), and a very narrow beamwidth (approx. 5-10 degrees). As a result, the gain they obtained from this antenna was a staggering 38 dB!

The reference signal they used it against was a 1000 kW transmitter with a 20 dB curtain antenna. The test signal was directed to the Washington / New York area. What happened was as follows. It started at 1000 kW; they increased power and monitored signal strength received in Washington. As the test transmitter power approached 2000 kW, they found that the received signal strength started to decrease. At 3000 kW the received signal was almost gone, but why?

Radiosondes and satellites were then dispatched to analyze the signal. What they found was surprising. At 3000 kW and 38 dB of antenna gain, the signal was of such power, that it was heating up a spot in the ionosphere. But instead of creating a solid area of reflection, they discovered they were actually burning a hole in the ionosphere and the signal was being shot off into space. They also noticed that the area of the ionospheric hole had an effect on approaching weather fronts. The weather fronts were being deflected around the ionospheric heated area, inadvertent weather modification.

So they reduced the power, received signal strength improved, but not much over the reference signal. They experienced lots of fading, especially when the ionosphere was unstable, that the solar winds

would push and pull at these heated-up areas of the ionosphere and move it around. They did, however, notice that as the ionospheric hole decreased in size, they were also able to transmit a second signal beamed to the same spot at much higher than the MUF and HPF; however, the received signal was very unstable, because of the lack of symmetry and alignment due to the number of hops. This method had been used before, but just for one hop.

The parabolic antenna was modified to a wider beamwidth (approx. 30 degrees) and the frequency range was expanded to 5.5-22.0 MHz. The result of this was a drop in gain to 29 dB, which is still fantastic.

The high power transmitter program was canceled, and soon after many of the engineers were laid off, but 20-30 were provided safe passage out of the Ukrainian SSR and ended up in Alaska working on the US HAARP project. ((c) Rick Slobodian, Alberta, after visiting Ukraine, via BC-DX)

They tried to serve North America with 3000 kW and an antenna with a gain of 38 dB, resulting in a ERP of almost 19 million kW (Kai Ludwig, Germany)

The original aim of these tests was to try to "optimize" jamming on SW (Bernd Trutenau, Lithuania, BC-DX)

Also, the widely observed USSR - Woodpecker signals originated from Ukraine territory near Poltava, as described in German magazines in the 70s. The row/fence of the giant antenna tower installations (maybe 8x8 or 16x16 dipole arrays?) could easily be seen from aircraft and spacecraft (Wolfgang Büschel, BC-DX)

ALASKA The former KGEI transmitter, which was purchased by Calvary Chapel and then stored in a potato hut in Idaho, was sold again in October 1999 to Aurora Communications. Last June, two tractor trailer rigs transported it to Ninilchik, Alaska, on the Kenai Peninsula not far from KNLS. The building is to be dedicated in August, and on the air by 2002 as a new service to Russia, in Russian, two or three hours of religious programming each evening repeated for different time zones. Some of the old KGEI engineers have come out of retirement to work on refurbishing the transmitter. It will run at 250 kW with three antennas - a corner reflector, a log periodic, and a TCI 611 curtain (Hans Johnson, Cumbre DX)

ASCENSION The whole island is almost one enormous antenna farm with RAF, GCHQ, USAF as well as ourselves. I have 70 employees here who are all from St Helena; they go home once every two years on the RMS boat. I'm lucky; I can escape every 8 months to the UK! You can see a few pictures of the Island here: <http://www.ascension-island.gov.ac/virtualtour/index.html> (BBC/Merlin staff, BCDX)

AUSTRIA [non] After several weeks of German, ORF finally got English on the Canadian relay 17865 at 1630 (Mike Horan, IL)

BHUTAN BBS introduced a new weekday morning service Nov 15 on 6035. M-F 0100-0530, 0800-1230. The second transmission begins with English announcements, program summary and followed by News in English at 0801. Signature tune at 0058 and 0758; Sa/Su 0400-1000. English continues at 1000-1100 with news at 1001 (Alok das Gupta, Calcutta, India, Electronic DX Press)

BOLIVIA Reactivated is R. Constelación, Guanay, on 4766.4 heard at 2230, relaying their FM (Rogildo Fontenelle Aragão, Bolivia, radioescutas)

BRAZIL Rádio Difusora, Taubaté, SP, has returned to 4925, heard 0400-0430 with *Madrugada Difusora* IDing with 570 and 4925 (Célio Romais, DX Clube do Brasil) Also heard on 4925 thanks to this tip, 0655-0715 with announcements, international pop music and música popular brasileira (Enzo Gehrig, Dénia, Spain)

CANADA Allan McFee, a longtime CBC radio personality famous for his off-beat music choices and unusual stunts, died Dec. 12 at the age of 87. McFee is remembered for a 20-year on-air partnership with Max Ferguson and later as host of the *Eclectic Circus*, during the '70s and '80s. McFee had a reputation early on as a rebel at the CBC, joking on-air and clashing with producers and bureaucrats who tried to repress his act. One of the ways he'd vent his frustrations was to dot the studio ceiling with asparagus tips he'd thrown in the air (CBC Online via Ivan Grishin and Bill Westenhaber)

CANADA On Maple Leaf Mailbag, director of RCI Robert O'Reilly was talking about future programming plans. The idea is to increase in-house production - meaning there will be fewer CBC programs on shortwave as early as the next season (A-01). The other driving force is the application of their mandate, focused on broadcasting to non-Canadians overseas (Ricky Leong, QC) He virtually admitted that the CBC programming was temporary fill until RCI could produce more of its own programs. More RCI is fine, but not at the expense of CBC. At least one SW transmitter should be dedicated to continuous relay of CBC to the USA! (gh)

I have long contended, from decades back, that the CBC really should have been a cover-Canada-by-shortwave service rather than a local-AM and local-FM radio service. Let the local stations be regular commercial radio as in the US, and provide the great CBC programming to everyone with shortwave, beamed in-

*All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; B-00=winter season, October 29-March 31; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

land from both coasts. This would have had the side benefits of letting us here in the USA hear it well, and provide a great shortwave-receiver market which would have stimulated manufacturers worldwide to make many more SW receivers in a wide price range and with many more features than are now available. And no one would be talking about "the death of shortwave," as they do so often now! (Will Martin, MO, to RCI via DXLD)

RCI made a number of frequency adjustments in early December, so that from Sackville the 0200 hour in English uses 6040, 9755, 11725, 11990 (Bill Westenhaver, RCI) 2100 on 9805, 13650; 2300 M-F on 5960, 6040, 9755, 11865, 13730. Latest schedule is at <http://www.rcinet.ca/horaires/techsche.htm> (Ricky Leong, QC)

RCI's webcasts via <http://www.rcinet.ca> fill in some times when there is no English on SW, notably 0300-0500, scheduled: UT Sun 0300 The House, 0400 Global Village; Mon 0300-0500 Cross Country Checkup; Tue-Sat 0300 The World At Six; 0330-0500 As It Happens (gh)

CHINA On 2340 and 4975, Fujian PBS at 1530 with health phone-in. Almost all the Chinese regional stations on MW and SW now seem to carry endless phone-ins on the subjects of health, disease and sexual dysfunction for the entire evening every single day – with interruptions for advertisements promoting various pills, potions, clinics and even mental hospitals. It's struck me before that China seems to suffer from more than its fair share of hypochondria, but this is getting ridiculous! (Alan Davies, Vietnam, Cumbre DX)

CHINA [non] A schedule via Nikolay Rudnev and Anatoly Klepov, Rus-DX via BC-DX of foreign relays via CIS transmitters includes Falun Dafa Radio via Tajikistan: 9415 1400-1500 500 kW FDR. The Bulgarian site at 2200 moved from 12 to 9.3 MHz frequency range (gh) I got a verification by email – from Falun Dafa Radio 9330! Levi Browde answered fast and promised to come back later with additional info. The report was sent to editor@faluninfo.net and answered by levi@bestweb.net (Björn Fransson, Sweden, SW Bulletin)

CONGO DR Radio Télé Liberté, 15725, replied by E-mail in French from Olivier Kamitatu, MLCongo@compuserve.com Said they had a 20,000-man army fighting against the Kabila dictatorship; station would return to air in December. Web: <http://www.mlc-congo.org> (Paul Ormandy, New Zealand) RN Media Network classifies it as a hate radio potentially inciting genocide

COSTA RICA RFPI has a new e-mail account radiopaz@racsa.co.cr (Willie Barrantes V, RFPI)

Due to a mistuned satellite downlink, TIDGS 9725 broadcast a string of numbers over and over, presumably some transponder ID info in (modulated) CW for at least two hours one evening, instead of University Network programming (George Thurman) On 4694.97 at 0217 Dr. Gene Scott preaching, very weak // 5030 and 11870 (Mark Mohrmann, VT) This is a difference product: 9725 minus 5030 equals 4695. I suspect one could find others by differing – and perhaps summing – all possible pairs of TIDGS frequencies (if both be on the air) (gh)

CZECH REPUBLIC R. Prague logged on 5055 at 0315 in Spanish, SINPO 33443 (Herman Römer, Netherlands, Benelux DX Club) From 0100 to 0327, R. Prague via Litomysl site uses 7345 and 6200 in English, Spanish and Czech to the Americas. 5055 is a rare mixing product between the two, which could also happen on 8490 (Wolfgang Büschel, BC-DX)

DOMINICAN REPUBLIC The decision to change from UT-4 to UT-5 was reversed after only one month; caused too many problems and was not properly authorized (Ultima Hora via Dino Bloise, FL)

ECUADOR HCJB's Allen Graham is on a fund-raising tour of the US until March, but, unlike his predecessor hosts of DX Partyline, has continued to produce the show on the road, sending voice files from his laptop to Quito where Jeff Ingram compiles them into abbreviated half-hour programs (gh)

EGYPT Radio Cairo with Arabic to South America after 2330 from Abis on 15590 and 17770 was suffering from a badly working noise gate, a unit which is used to mute noisy feed circuits when they have no audio. This noise gate did not open properly, resulting in just shreds of audio coming through. I am rather certain that the infamous audio on 9900 is caused by a similar malfunction, too; actually disappointing that they do not manage to solve such a minor problem. (Kai Ludwig, Germany, DXLD)

FRANCE Transmitter Documentation Project shows the old Issoudun facilities available, but nobody wants them, except when TDF had to substitute them temporarily for French Guiana. There are no less than eight 500 kW from 1973/1973, and probably another eight 100 kW from 1960/1962 still available. So TDF has really an abundance of spare capacity (Kai Ludwig, Germany, DX Listening Digest)

INDIA There are three new states in India, UTTARANCHAL (out of Uttar Pradesh), CHATTISGARH (out of Madhya Pradesh) and JHARKHAND (out of Bihar). Of these, Jharkhand already has a SW transmitter at RANCHI – the capital of the new state. Uttaranchal state is carrying programs from AIR NAJIBABAD via the Delhi transmitter on 6030 at 0200-0310 and 1215-1430. The program starts and ends abruptly and no freq announcements are given for the new services. This is using a dipole antenna on the Nepal beam (Alok das Gupta, Calcutta, India, Electronic DX Press)

IRAN VIRI's Radio Shalom service in English clearly is anti-Israel, with news about "the Zionist regime," etc. But I wonder, what's the point? VOIRI has English broadcasts aplenty. So it seems to be targeted specifically for an Israeli audience, especially under this name. But they won't get dedicated listeners (Silvain Domen, Belgium, DX Listening Digest)

IRAQ RII English 2000-2045, German 2045-2145, French 2145-2215, Turkish 2215-2300; also English 0200-0245, German 0245-0345, French 0345-0415, Turkish 0415-0500, then a foreign service in Arabic all on

11785 variable. Times vary by 5 minutes and the service is not daily; the 0200 service sometimes misses a language (Robertas Petraitis, Lithuania, World DX Club Contact)

KYRGYZSTAN Kyrgyz Radio, 4010, does not seem to have English at 0010 any more (Börge Eriksson, Sweden, SW Bulletin)

LIBERIA [non] KVOH Liberia may puzzle you. After High Adventure Ministries had to leave Lebanon, they hoped to install the transmitters in Liberia. Time will tell, but we did want to protect the frequencies (Anne Case, George Jacobs Associates via Crystal) I have been monitoring for GJA several years. I do not know of any case in which an Alternative frequency was actually used. Alternatives are of interest to frequency managers, but not to listeners. They serve to protect the frequencies (David Crystal, Israel)

LITHUANIA I heard R. Vilnius lament having to use the German relay 6120 for English to NAM at 0030. They say it costs them 3 times what two local sites would run. Tests on 6000 (swamped by Cuba) and 9735 have not received kudos from listeners. I've written them asking if they can retune to 9775, 9780 or 9785 (Bob Thomas CT) 9735 was considerably better than 6120 here, somewhat surprisingly (gh, OK)

MONACO [non] I looked at a high-resolution hiking map of the Côte d'Azur and Monte Carlo area, scale 1 cm = 1 kilometer. There never has been a broadcast transmitter location on Monaco soil, not on LW, MW, or SW at least from 1946 onwards. The known transmitter sites are from 200 to 3000 meters north of the border in France; and the Roumoules site is 102 km west (Wolfgang Büschel, Germany)

MONGOLIA VOM program schedule is unique as on one side presents its schedule, other side of folder the complete flight schedule of the Mongolian airline! A good idea to find a sponsor for program schedules (Wolfgang Schweikert, Germany, BC-DX)

NETHERLANDS/ANTILLES Bonaire relay has been operating normally with temporary generators; permanent replacements to be in use by March. For a report and pictures of the staff there see <http://www.rnw.nl/realradio/features/html/bonaire001201.html> (Andy Sennitt, Media Network Newsletter via John Norfolk)

NEW ZEALAND ZLXA Engineer Steve Jepson says they are running full power 1 kW; just replaced some tubes so 3935 is actually putting out a better signal (via David Norrie, NZ, Cumbre DX)

NICARAGUA According to a personal letter from Evaristo Mercado Pérez dated Nov. 29, 2000, Radio Miskut [5770-USB] resumed transmission on Aug. 7, 2000, thanks to help from John Freeman. He was scheduled to visit the station on Dec. 10 to install a 3 kW power amplifier for shortwave. They now broadcast at 1200-2400 with VOA news relay at 1200-1230, 1700-1730 and 2300-2400. They would extend service until short after local midnight (i.e. 0600) on Christmas and New Year's day (Tetsuya Hirahara, Japan)

On 2879.64, Radio Maranatha, 2 x 1440 harmonic at 1026-1110, at 1042 a decent "Radio Maranatha" ID. A few pieces of anthems or hymns after 1100 (Mark Mohrmann, VT)

OMAN BBC has started building a new 35 megapound relay in the eastern mainland town of al-Ashkharah, to replace existing Masirah Island station, built in 1966, which suffered interference due to new military installations. Expected to be completed in 2002, says resident engineer David Bones (Reuters via K4CC, swprograms)

PALESTINE [non] Of Iran's 24h Arabic broadcasts this one is known as Voice of Palestine: 0330-0430 Daily 7.250 9.610 (© BBC Monitoring)

PAPUA NEW GUINEA NBC, 4890, Dec 9 2006-2045, fading in with religious choral music, dead air, PNG and western Pacific/eastern Asia current weather conditions for Bougainville, Manus, Daru, etc. Peaked around 2040 but fading quickly by 2046. As bad as conditions were, I'm amazed this was coming in (Dave Valko, PA, hard-core-dx) Yes, an unheard-of time for this to be audible in USA (gh) Long-path (Bill Smith, TX)

PERU The Celendin station on 4655 kept changing names, most recently Radio Ecos del Edén instead of La Voz del Campesino, Dec 8 at 0020-0110.

Harmonic on 13565.4, Ondas del Pacifico, Ayabaca, heard signing on at 2050 with NA; something unique with this: I cannot hear it at all on fundamental 6782.7, but the harmonic booms in (Rafael Rodríguez R., Bogotá, D.C., Colombia) Very weak signal on 13565.33 tentatively this until 0311*, not a trace of audio on 6782.66 (Mark Mohrmann, Coventry VT, DX Listening Digest)

On 6797.56, Radio Ondas del Rio Mayo, Nueva Cajamarca; 1045-1106 with early morning show El Madrugador. At 1056 ID gave AM, FM, and "OAZ9Q 5045 kHz onda corta cobertura internacional." The short-wave frequency and call sign announced are fake (Takayuki Inoue Nozaki, Tokyo, Relámpago DX Logging)

Frequency list of active SW stations in Perú compiled by Hermod Pedersen: <http://www.hard-core-dx.com/nordicdx/andes/peru/index.html>

RUSSIA VOR's scheduled one hour morning English to WNA at 1500 on 7180 via Far East was actually monitored running as late as 1700, apparently only on weekends (gh)

[non] The Maiac site in Moldova broadcasting VOR in English to NAM at 0200 on 7125 and 7180 was put off the air in early Dec due to ice storm damage. Several days later 7125 came back, apparently transferred to another site, Tbilisskaya (Olle Alm, Sweden, BC-DX)

VOR promoted that it had successfully carried out digital SW tests in November, after the fact, with Thomcast equipment from a site near Moscow (VOR news via Sergei Sosodkin) More digital tests were made in December from Irkutsk site to Japan (gh)

Shortwave Broadcasting

SAUDI ARABIA Bandscanning for something interesting to listen to while lunching at my favorite Chinese restaurant, from my table next to an east-facing window, I enjoyed virtuosic performances on the Holy Qur'an Station, 15205, scheduled with 500 kW at 1600-1800 toward us. The only (webcasting) American station I have found with such lovely music is KAZU, Pacific Grove CA, <http://www.kazu.org>, UT Tuesdays 0400-0600 on A Fezful of Possibilities (gh)

SLOVAKIA One station that could stand to change frequencies, at least to NAm, is Radio Slovakia Int'l. For English/ Slovak/French at 0100-0230, 5930 is bothered by splatter from WWCR 5935, while 7230 is QRM'd off and on by hams. 9440 has only a tiny bit of splatter from Turkey on 9445, but is beamed to SAm and is only marginally useful here (Mike Horan, IL, DX Listening Digest) Previously used a 7 MHz frequency above the hamband; why such a retrograde move? (gh)

SRI LANKA SLBC All Asia Service in English heard at much stronger level than before from 0030 past 0130; // 9770 also very strong but severe QRM from Germany 9765 (Stephen Bass, OH, Electronic DX Press)

Clandestine on 7460, Voice of Tigers is back. Heard *1230-1255*. Audio is absolutely appalling (Abdul Karim, India, Cumbre DX)

SUDAN [non] Radio Voice of Hope via RN Madagascar 12060 and 15320 UT Saturday only 0426-0525 in English and local language; the lower frequency held up better (Richard McVicar, NY, swbc@topica.com)

Has own Web site at <http://www.radiovoiceofhope.net/> and also available online at <http://www.omroep.nl/cgi-bin/streams?rnw/archief/voiceofhope/0530.ra> Each program will remain online for one week and will be replaced by the latest broadcast shortly after transmission (© Radio Netherlands Media Network) QSLs can be sent via E-mail, hope@africanonline.co.ug E-mail response for a reception report in one day: QSL card will be sent via normal mail, was the message. (Paul Bailey, Tasmania, DX Listening Digest)

TAIWAN Before budget cuts for Jan 1 were announced, RTI English program grid showed two different sets of features rather than the 0300 broadcast being a repeat of the previous day's 0200. All start with news. All UT Mon-Fri end with Let's Learn Chinese [tho there may be different levels depending on day of week]; all UT Sundays end with Mailbag Time. Set one on Saturdays end with LLCh, Set two with Taiwan Excursions, along with the "middle" features. Set one is on these UT day broadcasts: 0200, 0700, 1200, 2200 including: Mon, Jade Bells & Bamboo Pipes; Thu, Journey into Chinese Culture; Hot Spots. Set two is on these UT day broadcasts: 0300, 1400, 1800, including: Sun, Instant Noodles; Wed Floating Air; Fri, Miss Mook's Big Countdown (from RTI grid via Christopher J. Williams, World DX Club Contact)

UKRAINE RUI got the message last month about interference on 9810. In early December changed to 9385, azimuth 307 degrees to Eastern Coast of North America Reports wanted to egorov@nrcu.gov.ua (Alexander Yegorov, Ukraine via Wolfgang Büschel) That includes English at 0100 and 0400 (gh) 9385 quality varies widely, from woeful to fair (Bob Thomas, CT) Fair to good (Brian Alexander, PA)

UAE HFCC-B00 data excludes Dubai assignments; there appears to be no official Web site for UAE-Dubai, it refuses to answer any of my QSL requests, and simple enquiries by fax and postal mail for schedules are consistently ignored. It is supposed to have services intended for Australia and Japan, but its reluctance to communicate is annoying. Perhaps I should go there and see what the problem is? There are many British expatriates working at UAE Radio Dubai, so it shouldn't be a problem at all (Bob Padula, Electronic DX Press)

UK What's a good alternative for hearing BBC's mailbag Write On (and replaced once a month by Waveguide) since only one broadcast is scheduled to Americas, Sat 0430? (Will Martin, MO) Try Sat 1945 from Ascension to Africa, usually audible here off the back on 15400 or 17830 (gh)

Subdividing BBC WS programming into categories World News, World Living, World Showcase, World Insight was a lousy idea. These names are so vague, that I never can remember which shows are in which category, and thus time block. And The Weekend is a separate category on the same level, to confuse things further. Even though BBC On Air is still monthly, the day-by-day listings only show broad titles at the next level down, e.g. Essential Guide, rather than the specifically-titled series currently running in that block, e.g. Russia: Gold Domes, Black Earth. If one has a program title, and wants to look up the details and timings for it, there is nothing to do but hunt through the pages until one finds it, since nothing is in alphabetical order, and the categories make no sense. Another example, Body and Mind, how health and medicine relate to you is under World Living, whilst Health Matters, the latest research – explaining where medicine is going, is under World Insight. World Living is so broad and vague it contains everything from religious shows to Jazzmatazz and Poems by Post. You might think Omnibus, about Charing Cross Road, would be under World Living. No! It is part of World Showcase.

Many of the programs I like to hear are in the weekday 1400-1600 UT period, but I find myself constantly switching back and forth between the two webcast streams, European and American. Europe has one hour each of World Showcase, and World Insight. America has World Living and World Insight. Hmmm, both with Insight at 1500? But they are never parallel; often the same shows are one or more days apart. Does it make any programming sense that Americans need to hear one program on a Monday, Europeans on a Tuesday? No, they do this just to make everything more complex and confusing, not least to their own operators, let alone the listeners (Glenn Hauser, DX Listening Digest)

USA Ken Berryhill's musical shows provide sorely needed relief to all the religious and political palaver on WWCR's schedule. We've noticed a new one, The Old Jazz Boy, featuring Dixieland, Sunday 1930-2000 on 15685, repeated UT Monday 0030 on 3215. Other Berryhill shows were scheduled: The Old Record Shop, Sun 0730 3210; Ken's Country Classics, Mon 0700 and 0900 5070; Profiles (5 mins.) Sat 1200 15685, Mon 0400 3215. Since these are unsponsored, they may appear unexpectedly when a slot open up. For background on Ken Berryhill, and his original show The Old Record Shop see: http://www.wwcr.com/cr_ors.html Another new(?) music show has crept onto the WWCR program schedule, printed version for December: Big Band Classics with Warren Durham, Sat 1730-1830 on 12160, 2300-2400 on 5070. Then there is Musical Memories with Martha Garvin, Sun 1130-1200 on 5070 (gh)

As of Jan 6, my half hour program Seldom Heard Radio is heard on the first & third Saturday nights (technically Sunday AM on the east coast) at 0600 UT on WRMI 7385. This is a change from Friday nights. It follows Scream of the Butterfly. Seldom Heard Radio will continue to focus on obscure and lesser known folk, psychedelic and ethnic music from the 1960s to the present. Contact: Fred, Seldom Heard Radio, 36 West Main Street, Warner NH 03278 singinggrove@conknet.com

WWFV/WGTG announced that it has suspended work on its third transmitter and additional antennas. This is apparently connected to another Genesis Communications Network ending its airtime purchase on 9400/9320/5085 (Hans Johnson, Cumbre DX)

WRNO's transmitter is an amateur radio unit rated at 1 kW max. Used as a broadcast transmitter, they are running about 100 watts, but it does go into their log periodic antenna. This can only operate on 7355 and 7395 nominal, not on listed 15420. They continue to use one of the 7 MHz frequencies at times they are scheduled for 15420. They have a few other programs on the weekend; otherwise they air Brother Stair. It is a bit harder to hear, but WRNO hasn't been off recently. Heard almost every night in WY over the summer, albeit weak. Valko reported much stronger signals from PA (Hans Johnson, AZ, Cumbre DX) WRNO definitely heard on 7354.38 at 0123 with preaching, very weak, and only at threshold. A real DX catch! (Walter Salmaniw, Victoria, BC)

WMLK: we have been checking 9465, scheduled 1600-2100 (except Saturdays), and find a carrier there of poor strength, tending to be masked by super-power WWCR on 9475, but no modulation detectable, which would be in keeping with WMLK as was its offgoing at precisely 2100. At times can almost imagine hearing the intonations of Elder Meyer. If a station runs a transmitter for hours despite lack of modulation, are they competent to manage a 250 kW unit, as reported last month? FCC W-00 9465 listings with power and target zones:

0400-0900 WMLK 50 53 27,28,39
1200-1300 KTWL 100 345 45
1400-1900 KFBS 100 323 30-33,42-44
1600-2100 WMLK 50 53 27,28,39
2100-2200 KTWL 100 335 44 (gh)

In order to distance itself from the government and enhance the perception of objectivity, VOA opened new website <http://www.voanews.com> and E-mail addresses ending in .com rather than .gov such as newsnow@voanews.com and cw@voanews.com The <http://www.voa.gov> Web site continues to exist as an administrative site for the Voice of America (Kim Elliott, VOA Communications World, paraphrased by gh) Mark Hattam in the U.K. asks if VOA intends to use the 11 meter band. VOA has no plans to use 11 meters. VOA also has a shortage of transmitters and antennas that work on that band (Kim Elliott, VOA Communications World via John Norfolk, Kai Ludwig)

[non] The General Board of Global Ministries of the United Methodist Church conducted a week of test broadcasts to Africa in early December, via DTK in Germany. Emphasis is not on preaching, but on programs promoting health and social welfare. Reply from Donna Niemann, program producer at radio@gbgm-umc.org said regular service would start Jan 1 on same schedule, i.e. to East Africa 0400-0600 11775, 1700-1900 13810; Central/South Africa 0400-0600 13685, 1700-1900 15485 (via Paul Bailey, Tasmania; Paul Ormandy, New Zealand) 15485 was heard well off the back of the beam here in central NAm; fax 1-212-870-3748; 475 Riverside Drive, New York, NY 10115 (gh) They are looking for segment producers to fill the two hours daily (Martin Spinelli via Chet Copeland)

VATICAN [non] In the winter VR printed schedule RCC HQ are not exactly forthcoming and honest, as nothing whatsoever is said about certain of their transmissions being via relay sites. Indeed, the radial maps centered upon Rome certainly give the impression that all target areas are served directly from there! Yet we have info from the HFCC and Russia showing Khabarovsk, Chita, Petropavlovsk-Kamchatskiy used for certain transmissions on 6205, 5940. The VR sked shows these in Chinese, Vietnamese, and Japanese are "non-directional" since there is no letter-suffix indicating a target area, but this is certainly untrue as the relays have azimuths aimed at the appropriate countries. There is also one relay via Philippines on 6020, and some via Uzbekistan on 9865, 6205. Their website is no more candid: <http://www.vaticanradio.org/CoorPro/palinsasioce.htm> (gh)

VENEZUELA On 3059.78, Radio San Felipe, (2 x 1530 harmonic), 1016-1042 sign-on with anthem followed by canned ID, into live announcer. Fair signal (Mark Mohrmann, VT, DX Listening Digest)

...Until the next, Best of DX and 73 de Glenn!

0005 UTC on 7415

USA: WBCQ. Johnny Lightning's Radio New York program, calling himself the "Real Voice of America" from his, "bootiful Brooklyn facility." Trashed Matt Drudge referring to him as "Matt Sludge broadcasting with half his brain tied behind his back." Makes me think ole' Johnny is trying to be the left-wing Rush Limbaugh. **WHRI** 2300, 7580; **WWFV** (ex **WGTG**) 9320 USB, 2303 with *Power Hour* segment on lady who professes to be the bastard child of the Duke and Duchess of Windsor. (Sue Wilden, Noblesville, IN; William McGuire, Cheverly, MD)

0005 UTC on 15180

NORTH KOREA: Radio Pyongyang. Korean news with fading, // 13760, 11710. (Jim Boynton, Newton, MA) 0007-0018+, 13760.1 English news on Kim Jong Il. ID 0016 with rousing military music // 151179.9, nothing on // 11460. Station audible *0000-0005* 11460 with ID and news; 11710; //137600 SIO=544; //15180 SIO=544 (Harold Frodge, Midland, MI)

0017 UTC on 9400

BULGARIA: Radio Bulgaria. Bulgaria marks the 11th anniversary of the collapse of communism, //9400. (Bob Fraser, Cohasset, MA) 0345, 9400 *Radio Bulgaria Calling*; 2200-2245, 7200. (Jim Boynton, Newton, MA) 0330, 7400 *Time Out For Music*. (David Weronka, Benson, NC) 2145-2153+, 11700 feature on commercial radio SIO=4+33+; 2005-2012, 7500. East European news coverage to ID and *Behind the News* program. SIO=3+53. (Frodge, MI; McGuire, MD)

0400 UTC on 7180

RUSSIA: Voice of. World newscast. (Boynton, MA) *1300, 15460 station ID to newscast. *Moscow Mailbag* 2115 on 5940, featuring diamonds, Olympics, Lenin and WWII. (Fraser, MA)

0426 UTC on 15320

CLANDESTINE: Voice of Hope. Open carrier 0426 to instrumental music 0427. Sign-on announcement with freqs and schedules, and purpose of broadcast. Lively high-life style music. Male's 0430 talk segment in unid language, mentions of Sudan. English greetings to friends in Sudan and mentions of "Voice of Hope." Fair and clear signal quality. (Dave Valko, PA/Cumbre DX) **Voice of Jammu & Kashmir Freedom** 1415; 5101 kHz anti-Indian government programming. Signal quite satisfactory, 1437*. Address: P.O. Box 102, Muzaffarabad, Azad Kashmir via Pakistan. (Jouko Huuskonen, Turku, Finland/HCDX)

0552 UTC on 4960

DOMINICAN REP.: Radio Villa. Spanish. Fair signal for SIO 222, music program and station identification. (Daniele Canonica, Muggio, Switzerland)

0600 UTC on 9745

ECUADOR: HCJB. *Saludos Amigos* to station ID. (Boynton, MA) *Ham Radio Today* 1930 on 17660. (Fraser, MA)

1343 UTC on 13650

CANADA: Radio Canada Int'l. Interview with classical singer and her musical inspiration. (Wilden, IN) *Maple Leaf Mailbag*, 2125, 13650 (Fraser, MA); 0225, 9755 (Boynton, MA)

1350 UTC on 18960

SWEDEN: Radio Sweden. Report and interview on communities for the mentally handicapped. (Fraser, MA; McGuire, MD)

1410 UTC on 4850

INDIA: All India Radio-Kohima. Heavy interference from Tashkent. ID, "This is All India Radio, Kohima." AIR services noted as; 1720, 4940 **Guwahati** //4920 **Chennai**; //4910 **Jaipur**; //4880 **Lucknow**; //4800 **Hyderabad**; //4775 **Imphal**. Station **Radio Kashmir** 4950 to 1738*. (Huuskonen, FIN/HCDX)

1413 UTC on 21745

CZECH REP.: Radio Prague. Sports report into *Spotlight* show. (Boynton, MA) 2245, 7345 //9435 *A Day of Poetry in Public Places*. (Fraser, MA)

1459 UTC on 11734.09

ZANZIBAR: Radio Tanzania. After hearing this frequency in Hawaii, decided to sit on this freq and see if audible on the east coast. Signal did indeed pop on with highlife instrumental music.

Very brief children's vocals and male's extended newscast. Signal improved by 1505, fading by 1520. Never seemed to have an "official" sign-on, abruptly fades up with programming in progress. Signal very nice by 2000 recheck. (Valko, PA/Cumbre DX) 1655-1700, 11734 very good signal including music, ID and signal tone to 1700*. (Canonica, SU)

1600 UTC on 17680

JORDAN: Radio Jordan. Jordan *Ancient Cultures* program, featuring *Desert Castles # 7*, to classical music segments. Announcements to news broadcast and 1730*. (Martin Gallas, Jacksonville, IL) Station spur 6985 at 2033 //7155 with Arabic discussion. (Zacharias Liangas, Thessaloniki, Greece/HCDX)

1620 UTC on 7530 USB

SOMALIA: Radio Hargeisa. (Tentative) Very weak signal in local language, possibly Somalian. Recitations to Arabic style music at 1645. Utility interference commencing abruptly at 1645. Subsequent daily rechecks; 1644-1703, 7530 (Canonica, SU)

1945 UTC on 6973.1

ISRAEL: Galei Zahal. Signal noted early, although audio level weak but readable by 2005 with choral music and unid language. (Valko, PA/Cumbre DX) **Kol Israel** 2020; 9435 *Week in Review* (Boynton, MA; McGuire, MD)

1957 UTC on 11785

INDONESIA: Voice of Indonesia. Poor signal for ID, "this is the radio Voice of Indonesia" to anthem, ID repeat and schedule quote. **Deutsche Welle's Rwanda** relays' interference 2000. (Frodge, MI)

2055 UTC on 9965

ARMENIA: Voice of. Interval signal at tune-in, followed for station identification and newscast. Mailbag program including music selections. (David Ross, Hamilton, Ontario, Canada)

2100 UTC on 5100

LIBERIA: Radio Liberia Int'l. English news including segment on Liberian first lady. (Chambers, NY/ODXA) 2130-2204, 5100 Highlife music program to commentary. Station identification to brief time check and Awareness program. Very nice signal at tune-in but choppy towards the top of the hour. (Valko, PA/Cumbre DX) 2240-2310+. Continuous African music with brief top-of-the hour English national news. SIO=332, improved after 2245. Best to monitor in USB, other modes impossible. (Frodge, MI)

2151 UTC on 6265

ZAMBIA: Radio Zambia. Vernaculars text with phone interviews. African highlife music to station identification. Choral national anthem to 2206*. Signal weak to poor. (Chambers, NY/ODXA)

2230 UTC on 13600

BELGIUM: Radio Vlaanderen Int'l. Station ID and music segment. (Mindy Scheer, Dunnellon, FL) 0420, 11985 (Weronka, NC) 0756, 5985 (Chambers, NY/ODXA; McGuire, MD)

2253 UTC on 7125

GUINEA: RTV Guineenne. French service of talk and music intervals. Flute interval signal 2323 to African highlife music and station ID. Orchestral national anthem to 0001 *. Signal very strong initially, generally good to sign-off. (Chambers, NY/ODXA)

2310 UTC on 9655

TURKEY: Voice of. *Hues and Colors* program on coal mining area on the Black Sea //6020. (Fraser, MA; Weronka, NC; McGuire, MD)

2314 UTC on 15280

ARGENTINA: Radio Rivadavia. Spanish. Sports roundup segment and mentions of stations' Radio Independencia and Radio Dobleve, plus phone calls. Commercial breaks to time pips to ID 2335 with mentions of "Argentina" and "Futbol Continental"; SIO=2+33) (Frodge, MI)

SIO = Signal strength, Interference, Overall merit

*Thanks to our contributors – Have you sent in YOUR logs?
Send to Gayle Van Horn, c/o Monitoring Times (or e-mail
gayle@webworkz.com)
English broadcast unless otherwise noted.*

Latin Websites and More

ANGUILLA

Caribbean Beacon <<http://www.dgenescott.com/homepage.htm>>

ANTIGUA

BBC Relay <http://www.bbc.co.uk/worldservice/index_stat.html>
Deutsche Welle Relay <<http://www.dwelle.de/english/Welcome.html>>
Radio Vlaanderen Int'l Relay <<http://www.rvi.be/>>

COLOMBIA

Caracol Colombia <<http://www.caracol.com.co>>
RCN/Radio Cadena Nacional <<http://rcn.com.co>>
Radio Difusora Nacional <<http://inravisio.com/co/radiodifusora/onda>>
Caracol Estero <<http://www.caracolstereo.com/>>

COSTA RICA

Faro del Caribe <<http://www.cristo.net/faro/faro.html>>
Radio Exterior Espana Relay <<http://www.rive.es/rme.ree/>>
Radio Fides <<http://www.radiofides.co.cr>>
Radio For Peace Int'l <<http://www.rfpi.org>>
Radio Reloj <<http://www.rpreloj.co.cr/>>
University Network <<http://www.dgenescott.com/homepage.htm>>

CUBA

China Radio Int'l Relay <<http://www.cri.com.cn/>>
Radio Havana Cuba <<http://www.radiohc.org>>
Radio Rebelde <<http://www3.cuba.cu/RRRebelde/>>

DOMINICAN REPUBLIC

Radio Amanecer <<http://www.tricom.net/amanecer>>
Radio Cristal Int'l <<http://www.dominicano.com>>

ECUADOR

HCJB <<http://www.hcjb.org.ec>>

MEXICO

Radio Educacion <<http://www.cnca.gob.mx/cnca/buena/radio/index.html>>
Radio Huayacocotla <<http://www.sjsocial.org/Radio/huadad.html>>
Radio Mexico Int'l <<http://hello.ta/rmi>> <www.imer.gob.mx/estaciones/rmi.html>
Radio Mil <<http://www.nrm.com.mx/estaciones/radiomil>>

NETHERLANDS ANTILLES

Radio Netherlands Relay <<http://www.rnw.nl>>

PUERTO RICO

AFN/AFRTS <<http://www.mediacen.navy.mil/>> <<http://www.afrts.osd.mil>>

SURINAME

Radio Apintie <<http://www.apintie.sr>>

Two new Peruvians have been observed since last month's South American Directory:

La Voz de Albancay

Avenida Noviembre Lote 6
Urbanizacion Micaila Bastidas
Abancay, Apurimac, Peru

Radio Uripa

Avenida Tupac Amaru s/n
Uripa, Chincheros, Apurima, Peru

Additions and corrections are always welcomed. Thanks to Dave White for his website assistance and *Cumbre DX* for their Peruvian address update.

BRAZIL

Radiodifusion do Amazonas, 4805 kHz. Full data scenery card signed by Joaquim Marinho, plus personal note. Received in 56 days for a Portuguese report, two mint stamps and local AM bumper stickers. Station address: Caixa Postal 311, 69000-000 Manaus, Amazonas, Brasil. (Frank Hillton, Charleston, SC)

Radio Trans Mundial, 9530 kHz. Full data QSL card with illegible signature. Received in 93 days for a Portuguese report, one U.S. dollar and one mint stamp. Station address: Caixa Postal 18300, Aeroporto, 04699-970, São Paulo, São Paulo, Brasil. (Hilton, SC)

CUBA

Radio Havana Cuba, 13680 kHz. Full data color scenery card unsigned, plus program guide. Received in 148 days for an English report. Station address: P.O. Box 6240, Habana, Cuba 10600. (Brian Bagwell, St. Louis, MO)

Radio Rebelde, 9600 kHz. QSL Folder card signed by Daimelis Monzon-Esp. Relaciones Publicas. Received in 12 weeks for a Spanish report and one U.S. dollar. Email address: <rebelde@ceniai.inf.cu> (Richard Jary, Australia/Cumbre DX)

DIEGO GARCIA

AFN/AFRTS, 12579 kHz USB. Full data letter via email from Michael Fouth-Chief Broadcast Operations Specialist. Received in one day for an English email report. Email address: <qsl@mediacen.navy.mil>. (Mickey Delmage, Sherwood Park, Alberta, Canada)

ECUADOR

La Voz del Napo Full data station card signed by Ramiro Cabrera. Received in three months for a Spanish follow-up report and two mint stamps. Station address: Misión Josefina, Tena, Napo, Ecuador. (Sam Wright, Biloxi, MS)

HCJB, 9745 kHz. Full data scenery card unsigned. Received in 25 days for an English report and one IRC. Station address: Casilla 17-17-691 Quito, Pichincha, Ecuador. (Wright, MS)

GUATEMALA

TGMI Radio Buenas Nuevas, 4800 kHz. Full data station card un-

signed, plus brief note. Received in 35 days for a Spanish report, one U.S. dollar and one mint stamp. Station address: 13020 San Sebastian, Huehuetenango, Guatemala. (Tom Banks, Dallas, TX)

HAWAII

AFN/AFRTS 6350 kHz USB. Partial data letter on Naval Media Center letterhead signed by April K. Gorenflo-Broadcast Operations Specialist. Received in 27 days for an English email report. Email address: (see Diego Garcia) (Bill Wilkins, Springfield, MO)

HONDURAS

Radio Luz y Vida 3250 kHz. Full data prepared Spanish QSL card returned and verified by Ubaldo Zaldivar, plus personal note. Received in 50 days for a Spanish report, SASE (used for reply). Station address: Apartado 303, San Pedro Sula, Honduras. (Duane Hadley, Bristol, TN)

IRAQ

Radio Iraq International, 9684 kHz. Full data, Folder QSL card unsigned. Received in 63 days for an English report, no enclosures. Station address: P.O. Box 8145, CN, 12222, Baghdad, Iraq (on) P.O. Box 8125, Baghdad, Iraq. (Banks, TX)

MEDIUM WAVE

CBKN, 990 kHz AM, Shalath, BC, Canada. Full data QSL card signed by Dave Newberry-Chief Engineer. Received in 12 days via CBC Vancouver. Station address: P.O. Box 4600, Vancouver BC, V6B 4A2 Canada. (Patrick Martin, Rio Mirage, CA)

CKY, 580 kHz AM, Manitoba, Canada. Really nice full data QSL letter signed by George Buzunis-Chief Engineer, plus station history brochure. Received in 19 days for taped report. Station address: Rogers Broadcasting-Unit # 4, 166 Osborne St., Winnipeg MB R3L 1Y8 Canada. (Martin, CA)

KORG, 1190 kHz AM, Anaheim, CA. Full data verification letter signed by Miles Sexton-Manager. Received after nine years of trying! Station address: 1190 E. Ball Rd., Anaheim, CA 92805. (Martin, CA)

KSMH, 1620 kHz AM, Auburn, CA. Received second QSL via station form letter, signed by Tricia Lemmon-Development Manager. Re-

ceived in 90 days for a taped report. Station address: P.O. Box 180, Tahoma, CA 96142. (Martin, CA)

XENU, 1550 kHz AM, Nuevo Laredo, Tamaulipas, Mexico. Brief email verie text from Sergio Korlowsky-Head Engineer, Organizacion Radiorama, with promise of a future QSL on station letterhead. Received email response 30 months after posted report, three months after an email follow-up. Email address: <xe2xpk@nld.bravo.net>. (Paul Ormandy, Oamaru, New Zealand/HCDX)

MEXICO

Radio Mil, 6010 kHz. Full data colorful logo card with illegible signature, plus personal letter, sticker, schedule and reception report form. Received in 547 days for a taped report. Station address: Apartado Postal 21-100, 04021 Mexico 21, DF Mexico. (Delmage, CAN)

MONGOLIA

Voice of Mongolia, 12085 kHz. No data card plus personal handwritten message signed as, "The Staff." Program schedule and Mongolian Airline folder included. Received in 40 days for an English report, a SASE and one U.S. dollar. Station address: P.O. Box 365, Ulaanbaatar 13, Mongolia. (Jim Boynton, Newton, MA)

NETHERLANDS ANTILLES

Radio Netherlands Bonaire Relay, 15315 kHz. Full data card signed by Jaime Bagueña, plus station stickers. Received in 46 days for an English report and one IRC. Station address: P.O. Box 222, 1200 JG Hilversum, The Netherlands. (Hadley, TN)

PUERTO RICO

AFN/AFRTS, 6458.5 kHz USB. Partial data e-mail from Michael Fouth-Chief Broadcast Operations Specialist. Received in 27 days for an English email report. Email address: (see Diego Garcia). (Wilkins, MO)

SICILY

AFN/AFRTS 10940.5 kHz USB. Full data email from Michael Fouth-Chief Broadcast Operations Specialist. Received in one day for an English email report. Email address: (see Diego Garcia) (Delmage, CAN; Wilkins, MO)

It's Your VOA

If you've overlooked the Voice of America (VOA) – our publicly supported “official” international broadcaster – you're missing some interesting and informative programming. I would also gently suggest that you may be shirking an important responsibility that you – as both a seasoned radio listener and a taxpayer – should be shouldering. But more on that later.

◆ Governing Structure

The VOA operates as part of the International Broadcasting Bureau (IBB) which is under the jurisdiction of the Broadcasting Board of Governors (BBG). The BBG consists of eight members appointed by the President with the consent of the Senate. The Secretary of State is an ex-officio member. This construct is a recent one and is supposed to ensure the organizational independence of the VOA and protect it from political meddling. (A more complete explanation of the structure of U.S. international broadcasting is available on the Internet from <http://www.voa.gov>, <http://www.ibb.gov> and <http://www.ibb.gov/bbg>.)

◆ VOA Shortwave Services

There are three VOA English language shortwave services:

VOA Special English provides world news and feature programs using a slower speaking cadence and a limited 1500 word vocabulary.

VOA English to Africa was inaugurated in 1963 and functions as a regional broadcast service for Africa. For stateside listeners, the Africa service can be a good source for information about a continent that gets limited coverage from domestic media. Some notable programs are:

Straight Talk Africa, a weekday phone-in for Africa concentrating on African issues and concerns. (M-F 1830)

Daybreak Africa, Al James hosts a lively weekday breakfast show. (M-F 0300, 0430, 0600)

Africa World Tonight, an excellent nightly report on Africa and world events from an African perspective, in three live editions. (M-F 1630, 1800, 2000)

Nightline Africa, a somewhat more relaxed weekend evening news magazine, hosted by Ted Roberts. (A/S 1600, 2000)

World of Music, contemporary music with

African roots hosted by the incomparable Rita Rochelle (M-F 1930)

Music Time in Africa, Rita Rochelle highlights – in two editions – the best of traditional and modern African music, as selected by VOA's “Music Man,” Leo Sarkisian. (S 1730, 1930)

Voices of Africa, interviews with prominent Africans. (A 1910, S 1710)

VOA News Now is the largest and newest service which, as its name implies, primarily seeks to provide accurate, constantly updated news and analysis of current events for a global audience. Recently the service has made some tentative moves toward including additional half-hour feature programs into its schedule, mostly on the weekends. Some notable programs include:

Talk to America, a weekday global phone-in on topical issues, this has become the VOA's flagship program. (M-F 1705, with a weekend digest version, *Best of Talk to America*, A 0233, 1033, 1833; S 0633, 1433, 2233)

Communications World, a weekly report on telecommunications and international broadcasting presented by Kim Elliott. (A 0133, 0533, 0933, 1333, 1733, 2133)

Kaleidoscope, Susan Logue explores American culture from contemporary theatre to folk traditions. (1st, 3rd & 4th S 0333, 0733, 1133, 1533, 1933, 2333)

Our World, a weekly report on science, technology and agriculture with Rob Sivak. (A 0333, 0733, 1133, 1533, 1933, 2333)

[For frequencies and abbreviations, consult *MT's* Shortwave Guide section. For expanded information, use the Internet and go to <http://www.voa.gov> and <http://www.newsnow.com>.]

◆ Considering the Future

There has been talk over the past few years that reorganization of the Africa service was imminent. To date, though, changes that have taken place have been incremental or made largely to address transient crisis situations. Lately, internal discussions about *VOA News Now* have been a bit more dynamic.

VOA News Now grew, in significant part, out of a proposal tendered by Kim Elliott in 1993 when he was the VOA's audience research officer. The model suggested was the “all-news” approach popularized by many U.S. domestic AM radio stations and National Public Radio and which conformed better with the way radio was increasingly being used by the VOA's target audiences.

The service finally came into existence in 1998. Since then, two internal factions have apparently emerged. One argues largely for maintenance of a strictly all news service. The other is pressing for a partial resumption of music and the longer format block features the VOA used to have in abundance. In a recent memo to station management, Elliott himself weighed in with a moderate approach – urging maintenance of the 24/7 news presence while restoring a wider use of music and cautiously resuming some popular longer features. Doing so will add what he terms “radio's unique strength” – *personality* – back into the service, which he argues will be an important asset in encouraging needed audience participation via immediate feedback by phone, fax and e-mail.

To me, this resembles the NBC network weekend program *Monitor**, which ran nationally from 1955 to 1975. With some updating, this could be a suitable model. A more relaxed format would seem appropriate to the weekend and allow the service to more effectively build for listeners an accurate impression of the U.S. by stressing the vast, diverse and sometimes subtle facets of American everyday life, culture and values that make the U.S. unique in the world. This is not possible with *News Now*.

◆ It is your VOA

However, the point is not so much what Dr. Elliott thinks or what I think; but, what do you think? Not enough is known domestically about the VOA. The VOA is statutorily prohibited from communicating with a domestic U.S. audience, effectively imposing a know-nothing posture on the public. This is an unhealthy situation for both the VOA and the taxpayer. Several stations – Radio Canada International (RCI), Radio Australia and Deutsche Welle (DW) to name three – have learned the hard lesson that their futures rely as much on domestic public awareness and support as on any other factor.

So, the message here is listen to what the VOA is broadcasting in your name. Then, don't allow Congress or anyone else to shut you out of the process. Comment freely on what you hear – whether directly to the VOA or its governing bodies or to forums like this magazine or Internet discussion groups. You and I and the VOA will only be the better for it.

Until March, good listening! (*By the way, if you were a fan of NBC's *Monitor*, check out a great new web site about the program at <http://www.monitorbeacon.com>.)



HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa USA, Voice of America 5995am 6130ca 7405am 9455af
 ① ② ⑤ ③ ④ ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Standard Time) 5, 6, 7, or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each page.

Note that all *dates*, as well as times, are in UTC; for example, a show which might air at 0030 UTC *Sunday* will be heard on *Saturday* evening in America (in other words, 7:30 pm Eastern, 6:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not *daily*, the days of broadcast Å will appear in the column following the time of broadcast, using the following codes:

Day Codes

s/S	Sunday
m/M	Monday
t/T	Tuesday
w/W	Wednesday
h/H	Thursday
f/F	Friday
a/A	Saturday
D	Daily
mon/MON	monthly

In the same column ⑤, *irregular broadcasts* are indicated "tent" and programming which includes languages besides English are coded "v" (*various languages*).

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before publication.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the *target*

area Å of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas

af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
au:	Australia
ca:	Central America
do:	domestic broadcast
eu:	Europe
irr:	irregular (Costa Rica RFPI)
me:	Middle East
na:	North America
om:	omnidirectional
pa:	Pacific
sa:	South America
va:	various

Consult the propagation charts.

To further help you find a strong signal, we've included a chart on page 64 which takes into account conditions affecting the audibility of shortwave broadcasts. Simply pick out the section of the chart for the region in which you live and find the line for the region in which the station you want to hear is located. The chart indicates the optimum frequencies (in megahertz-MHz) for a given time in UTC. (Users outside North America can use the same procedure in reverse to find best reception from North America.)

Choose a program or station you want to hear.

Selected programs appear on the lower half of the page for prime listening hours – space does not permit 24 hour listings nor can every station be listed. However, listings for the most popular stations and selected lesser-known stations illustrate the variety available on shortwave. The format of the listings alternates among three different styles – by station, by genre and by day – month by month. Times listed are approximate and programs are subject to change.

The program listings emphasize broadcasts targeted to North America. In most cases, the stations and programs listed should be readily receivable in North America using a portable radio. Most broadcasters produce one broadcast in English per day that is repeated over a 24 hour period to all areas. If you are able to listen to transmissions to other areas of the world during "non-prime time" hours, referring to the prime time listings for those stations will likely be helpful in determining what programs will be broadcast.

Occasionally, a program or station listing may be followed by a reference to another listing for the same program or station at a different time. This is done to conserve space and make it possible to provide more listings.

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PROGRAM HIGHLIGHTS

JOHN FIGLIOZZI

New - Listings By Content

With this month, we inaugurate our second rotating format for *MT's Shortwave Guide* program listings. As you will see by perusing the pages, listed programs for each hour are grouped into twelve distinct categories.

As we said in January, these changes are designed to help you to locate the fine programs available on shortwave, many of which go unnoticed for one reason or another. Our objective is to make regular improvements to these listings. We appreciate your comments, assistance and corrections, which you can send by postal and electronic mail to the addresses provided elsewhere in this magazine. The stations would also deeply appreciate your constructive comments on their programs.

New at Radio Sweden

Radio Sweden has added two programs to its regular rotation. The science program *Horizon* has been replaced by the new program *The S-Files*, which runs monthly on the fourth Thursday or Friday UT of each month (depending on location and transmission). The S-Files will offer listeners a closer "behind the scenes" look at Sweden. Also, *Studio 49*, which had been an occasional program, has been moved up to a regular monthly slot – that is, the fourth Saturday/Sunday of every month. *Studio 49* is a conversational program that focuses on ideas and long-term trends in Sweden and the Nordic region. In that regard, it is similar in tone to YLE Radio Finland's *Capital Cafe*, which airs every Sunday. (Thanks to Rich Cuff of The NASWA *Journal* for this information.)

RA's Summer of Cricket (cont'd.)

Radio Australia's hot summer of cricket coverage continues in February with full broadcasts of the closing series of one day internationals:

Feb. 2 - West Indies vs. Zimbabwe from Perth (0230-1030 UT).

Feb. 7 - First Final from Sydney (0330-1130 UT).

Feb. 9 - Second Final from Melbourne (0330-1130 UT).

Feb. 11 - Third Final from Melbourne 0330-1130 UT).

On shortwave only: 0000-1358 on 21725 kHz/0000-0758 on 17580 kHz/0800-1358 on 11630 kHz.



0000	0100	as	UK, Global Kitchen/Merlin	3955eu	6180eu	7165eu	
0000	0100	f	UK, Global Kitchen/Merlin	6170eu			
0000	0100		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	13362va
				16847va			
0000	0100		USA, KAIJ Dallas TX	5755va			
0000	0100		USA, KTBN Salt Lake City UT	7510na			
0000	0100		USA, KWHR Naalehu HI	17510as			
0000	0100	twfha	USA, Voice of America	5995am	6130ca	7405am	9455ca
				9775am	11695ca	13740am	
0000	0100		USA, WBCQ Monticello ME	7415na	9335na		
0000	0100		USA, WEWN Birmingham AL	5825va	7425na	9355na	
0000	0100		USA, WHRA Greenbush ME	7580na			
0000	0100		USA, WHRI Noblesville IN	7315sa			
0000	0100		USA, WINB Red Lion PA	12160am			
0000	0100		USA, WJCR Upton KY	7490va	13595as		
0000	0100		USA, WRMI Miami FL	9955am			
0000	0100		USA, WSHB Cypress Crk SC	9430am			
0000	0100		USA, WTJC Newport NC	9370na			
0000	0100	sm	USA, WWBS Macon GA	11900eu			
0000	0100		USA, WWCR Nashville TN	3215am	5070am	5935am	7435am
0000	0100		USA, WWFV McCaysville GA	9320va	12172am		
0000	0100		USA, WYFR Okeechobee FL	6085na	9505na	15060as	
0000	0100	vl	Vanuatu, Radio	3945do	4960do	7260do	
0000	0100		Zambia, Christian Voice	4965do			
0030	0100		Iran, VOIRI	6065am	6135na	6150na	9022na
0030	0100		Kirgiziya, Kirgiziya Radio	4010eu			
0030	0100		Lithuania, Radio Vilnius	6000na	9735na		
0030	0100		Sri Lanka, Sri Lanka BC Corp	4940do	9770eu		
0030	0100		Sri Lanka, Sri Lanka BC Corp	4940do	6005as	6075as	9770as
				15425as			
0030	0100		Thailand, Radio	13695na			
0030	0100		UK, BBC World Service	5965as	5975na	6175na	6195as
				7105as	9410me	9590am	9915sa
				11955as	12095sa	15280as	15360as
				17790as			
0030	0100		USA, VOA Special English	7215as	9890as	11760as	15185as
				15290as	17740as	17820as	
0030	0100		USA, Voice of America	7215as	9890as	11760as	15185as
				15290as	17740as	17820as	
0045	0100	vl	Pakistan, Radio	9780as	11650as	15455as	
0050	0100		Italy, RAI International	6010na	9675na	11800na	
0050	0100		UK, International BC Tamil	11570as			

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FREQUENCIES

0100 0110	Italy, RAI International	6010na	9675na	11800na	0100 0200	New Zealand, ZLXA	3935do	7290do
0100 0115	Pakistan, Radio	9780as	11650as	15455as	0100 0200 vl	Papua New Guinea, NBC	9675do	11880do
0100 0125	Netherlands, Radio	6165na	9845na		0100 0200	Singapore R Corp of Singapore	6150do	
0100 0127	Czech Rep, Radio Prague Intl	6200na	7345na		0100 0200 vl/as	Solomon Islands, SIBC	5020do	
0100 0127	Iran, VOIRI	6065am	6135na	6150na	0100 0200 vl/a	Solomon Islands, SIBC	9545do	
0100 0127	Vietnam, Voice of	9525na		9022na	0100 0200	Spain, R Exterior Espana	6055na	
0100 0130 s	Germany, Universal Life	9435as			0100 0200	Sri Lanka, Sri Lanka BC Corp	4940do	6005as 6075as 9770as
0100 0130	Slovakia, R Slovakia International	5930na	7230ca	9440sa				
0100 0130	USA, Voice of America	7115as	7200as	7200as				
		11705as	15250as	15300as				
		17820as		17740as				
0100 0130	Uzbekistan, Radio Tashkent	5955as	5975as	7105as	0100 0200	Switzerland, Swiss R International	9905am	
		9540as		7285as	0100 0200	UK, BBC World Service	5965as	5975na 6175na 6195as
0100 0145	Germany, Deutsche Welle	6040am	6145na	9640am			5950am	9915sa 11955as 12095sa
		9765na		9700na			9410me	
0100 0156	China, China Radio International	9570na					15280as	
0100 0156	North Korea, R Pyongyang	3560va	11735va	15229va	0100 0200 as	UK, Global Kitchen/Merlin	15310as	15360as 17790as
0100 0200	Anguilla, Caribbean Beacon	6090am			0100 0200	Ukraine, R Ukraine International	3955eu	6180eu 7165eu
0100 0200 vl	Australia, ABC/Katherine	5025do			0100 0200	USA, Armed Forces Radio	7420na	9610na 9385na 11840na
0100 0200 vl	Australia, ABC/Tennant Creek	4910do					4278va	4319va 4993va 5765va
0100 0200	Australia, Christian Voice	9875va	15165va	17645va			6350va	6458va 6847va 10320va 10940va
0100 0200	Australia, Radio	9660pa	12080pa	15240as			12689va	13362va 16847va
		17580va	17750as	21725va				
0100 0200	Canada, CBC Northern Service	9625do			0100 0200 twfha	USA, KAU Dallas TX	5755va	
0100 0200	Canada, CFRX Toronto ON	6070do				USA, KTVN Salt Lake City UT	7510na	
						USA, KWHR Naalehu HI	17510as	
0100 0200	Canada, CFVP Calgary AB	6030do				USA, Voice of America	5995am	6130ca 7405am 9455ca
0100 0200	Canada, CHNX Halifax, NS	6130do					13740am	
0100 0200	Canada, CKZN St John's NF	6160do					9775am	
0100 0200	Canada, CKZU Vancouver BC	6160do						
0100 0200	Costa Rica, R for Peace Intl	7480va	15048va	15065va	0100 0200	USA, WBCQ Monticello ME	7415na	9335na
0100 0200	Costa Rica, University Network	7480va	15048va	15065va	0100 0200	USA, WEWN Birmingham AL	5825na	7425na 9355na
0100 0200	Cuba, Radio Havana	6000na	9820na	11705na	0100 0200	USA, WHRA Greenbush ME	7580na	
0100 0200	Ecuador, HCJB	9745na	11840na	21455usb	0100 0200	USA, WHRI Noblesville IN	7315sa	
0100 0200 a/monthly	Finland, Scandy Weekend Radio	11690va	11720va		0100 0200	USA, WINB Red Lion PA	12160am	
0100 0200	Germany, Voice of Hope	6185na			0100 0200	USA, WJCR Upton KY	7490va	13595as
0100 0200	Guyana, Voice of	3289do	5949do		0100 0200	USA, WRMI Miami FL	9955am	
0100 0200	Indonesia, Voice of	9525va	11785va	15149va	0100 0200	USA, WSHB Cypress Crk SC	9430na	
0100 0200	Japan, Radio	9515va	11860as	11870va	0100 0200	USA, WTJC Newport NC	9370na	
		17835sa		15325as	0100 0200 sm	USA, WWBS Macon GA	11900eu	
						USA, WWCN Nashville TN	3215am	5070am 5935am 7435am
0100 0200	Liberia, Voice of Hope	6280af			0100 0200	USA, WWFV McCaysville GA	6890va	9320am
0100 0200	Malaysia, Radio	7295do			0100 0200 vl	USA, WYFR Okeechobee FL	6065na	9505as 15060as
0100 0200	Malaysia, RTM Kota Kinabalu	5980do			0130 0145 vl	Vanuatu, Radio	3945do	4960do 7260do
0100 0200	Namibia, Namibian BC Corp	3270af	3289af		0100 0200 s	Zambia, Christian Voice	4965do	
0100 0200	New Zealand, R New Zealand Int	17675pa			0130 0159 s	Libya, Voice of Africa	11815af	17725af
					0130 0200	Finland, YLE/R Finland	9655na	12035na
					0130 0200	Lithuania, Radio Vilnius	6120na	
					0130 0200	Sweden, Radio	9495va	
					0130 0200 twfha	UK, RTE Radio	6155ca	
					0130 0200 twfha	USA, VOA Special English	7405am	9775am 13740am
					0140 0200	USA, Voice of America	5995am	6130ca 9455ca
						Vatican City, Vatican Radio	7335au	9650au

SELECTED PROGRAMS

Newscasts (*extended)

0100	BBCWS(am)	S/M	The World Today*
		T-A	News
	China R. Int.	D	News
	Deutsche Welle	D	News
	HCJB	D	Latin American & World News
	R. Australia	D	News
	R. Habana Cuba	T-S	International News
	R. Netherlands	S/M	News
	R. New Zealand Int.	D	News
	R. Prague	D	News
	Spanish Foreign R.	T-A	Ibero-American News*
	VOA News Now	T-A	World News
	Voice of Vietnam	D	News
0110	R. Habana Cuba	T-S	National News
	VOA News Now	T-A	Regional News
0114	VOA News Now	T-A	USA News
0130	R. Habana Cuba	T-S	News Bulletin
	RTE, Ireland	T-S	The News at Six*
	VOA News Now	T-A	World News
	VOA Spec. Eng.	T-A	News
0154	YLE R. Finland	S	Nuuntit Latini (news in classical Latin)

Current Affairs Magazines/Features

0100	R. Habana Cuba	M	Weekly Review
	R. Netherlands	T-A	Newsline
0105	Deutsche Welle	M	Talking Point (journalists)
		T-A	Newslink
	R. Netherlands	M	Wide Angle (week in review)
0110	China R. Int.	S	Report on Developing Countries
		M-F	Current Affairs
		A	Global Review
	R. Australia	W	The National Interest
		H	Background Briefing (documentaries)
0115	R. Habana Cuba	T-S	Viewpoint
0130	Deutsche Welle	T	Insight
0136	VOA News Now	T-F	Dateline
0140	R. Habana Cuba	M/F	Caribbean Outlook
		A	Weekly Review
	VOA Spec. Eng.	A	In the News
0145	BBCWS(am)	S	Letter from America

Business/Economics

0115	Swiss R. Int.	A	Business Spotlight
	Voice of Vietnam	F	Vietnam Economy

0120	R. Prague	F	Economic Report
0130	China R. Int.	W	China Horizons
0145	Swiss R. Int.	A	Business Spotlight
0149	VOA News Now	T-F	Business News

Science/Technology

0105	R. New Zealand Int.	S	Eureka!
0110	R. Australia	T	The Science Show
0130	Deutsche Welle	W	Man and Environment
0140	VOA Spec. Eng.	T	Agriculture Today
		W/H	Science Report
		F	Environment Report
0145	VOA News Now	T-F	Science News
	VOA Spec. Eng.	T	Science in the News
		W	Explorations

Arts & Cultural

0105	BBCWS(am)	T	Meridian-Ideas
		W	Meridian-Screen (cinema)
		F	Meridian-Writing (books)
	R. Prague	S	The Arts
0110	R. Australia	M	Arts Talk
		A	Arts on the Air
0115	Deutsche Welle	M	Readings from Czech Literature
	R. Prague	M	Czechs in History (biweekly)
		H	Book Zone (2nd wk.)
	Swiss R. Int.	H	Culture and Society
0120	China R. Int.	S	In the Spotlight
	Voice of Vietnam	A	Literature and Arts
0135	Spanish Foreign R.	T	Entertainment in Spain
	Arts in Spain	F	
0145	Swiss R. Int.	H	Book Zone (2nd wk.)
	VOA Spec. Eng.	A	American Stories
		H	The Making of a Nation

Local Lives and Views

0100	Spanish Foreign R.	S	Visitors' Book
		M	Window on Spain
	Swiss R. Int.	D	Newsnet (Swiss magazine)
0105	R. Netherlands	S	Europe Unzipped
	R. New Zealand Int.	M-F	In Touch with New Zealand
	R. Prague	M	Letter from Prague

		T-A	Current Affairs
		D	Current Affairs
0110	HCJB	T-A	Studio 9 (Latin America)
	R. Australia	F	Hindsight (Australian history)
	R. Prague	M	From the Weeklies
	Swiss R. Int.	S*	The Name Game (Swiss geo quiz)
		M	Swiss Scene
	Voice of Vietnam	S	Weekly Review
		T/W/F/APress Review	
		H	Talk of the Week
0115	Deutsche Welle	S	Inside Europe
	R. Prague	T	Spotlight (Czech current events) or One on One (interview)
		H	Central Europe Today (biweekly)
	Spanish Foreign R.	M	Entrepreneur (food and tourism)
	Voice of Vietnam	T	Vietnam: Land and People
		A	Rural Vietnam
0120	R. Prague	W	Talking Point
0130	China R. Int.	M	People in the Know
		F	Life in China
	Deutsche Welle	H	Living in Germany
	Swiss R. Int.	D	Newsnet (Swiss magazine)
	YLE R. Finland	S	Capital Cafe (conversations)
0132	Spanish Foreign R.	T-A	Press Review
0135	Spanish Foreign R.	W	Kaleidoscope (life in Spain)
0140	Swiss R. Int.	S*	The Name Game (Swiss geo quiz)
		M	Swiss Scene
0145	VOA Spec. Eng.	F	American Mosaic (*1st wk.)

Informational Features

0105	Deutsche Welle	M	Religion and Society
	R. Australia	S	The Europeans
0115	Deutsche Welle	A	German by Radio
	Spanish Foreign R.	S	American Chronicles
0122	VOA News Now	T-A	Feature report
0130	BBCWS(am)	S	Reporting Religion
	China R. Int.	H	Voices from Other Lands
	R. New Zealand Int.	A	Changing feature or series
0132	Spanish Foreign R.	S	Spain in the American West
0135	Spanish Foreign R.	H	As Others See Us
0147	Spanish Foreign R.	T-A	Spanish Language Course
0154	VOA News Now	T-F	Feature report

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0200	0300		Singapore R Corp of Singapore	6150do			
0200	0300	vl/as	Solomon Islands, SIBC	5020do			
0200	0300	vl/as	Solomon Islands, SIBC	9545do			
0200	0300		South Korea, R Korea Intl	7275na	11725sa	11810sa	15575na
0200	0300		Sri Lanka, Sri Lanka BC Corp	6005as	6075as	6130do	9770as
			15425as				
0200	0300		Taiwan, R Taiwan International	5950na	9680na	11740as	11825pa
			15125as	15345as			
0200	0300		UK, BBC World Service	5975na	6135am	6175na	9410me
			9770af	9915sa	11760me	11955as	12095sa
			15280as	15310as	15360as	17790as	
0200	0300		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
				6350va	6458va	6847va	10320va
				10940va	12579va	12689va	13362va
				16847va			
0200	0300		USA, KAIJ Dallas TX	5755va			
0200	0300		USA, KJES Vado NM	7555na			
0200	0300		USA, KTBN Salt Lake City UT	7510na			
0200	0300		USA, KWHR Naalehu HI	17510as			
0200	0300		USA, Voice of America	7115as	7200as	9850as	11705as
			11820as	15250as	15300as	17740as	17820as
0200	0300		USA, WBCQ Monticello ME	7415na	9335na		
0200	0300		USA, WEWN Birmingham AL	5825va	7425na		
0200	0300		USA, WHRA Greenbush ME	7580na			
0200	0300		USA, WHRI Noblesville IN	7315sa			
0200	0300		USA, WINB Red Lion PA	12160am			
0200	0300		USA, WJCR Upton KY	7490va	13595sas		
0200	0300		USA, WRMI Miami FL	7385am			
0200	0300		USA, WSHB Cypress Crk SC	9430na	7535na		
0200	0300		USA, WTJC Newport NC	9370na			
0200	0300		USA, WWCW Nashville TN	3215am	5070am	5935am	7435am
0200	0300		USA, WWFV McCalysville GA	6890va	9320am		
0200	0300		USA, WYFR Okeechobee FL	6065na	9505na		
0200	0300	vl	Vanuatu, Radio	3945do	4960do	7260do	
0200	0300		Zambia, Christian Voice	4965do			
0200	1215		Cambodia, National Radio Of	11940as			
0215	0220		Nepal, Radio	5005as	7165as		
0230	0257		Vietnam, Voice of	9525na			
0230	0300		Austria, R Austria International	7325na			
0230	0300		Slovakia, Adventist World Radio	7235as			
0230	0300		Sweden, Radio	9495na	7155alt		
0230	0300		Switzerland, Swiss R International	9885am	9905am		
0245	0300		Albania, R Tirana International	6115na	7160na		
0250	0300		Vatican City, Vatican Radio	7305am	9605am		
0250	0300	vl	Zambia, National BC Corp	6165do	6265do		
0257	0300	vl	Malawi, Malawi BC Corp	3380do			

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FREQUENCIES

0300 0310	mtwhf	Greece, Voice of	5890na	7455na	7475na	12105na	0300 0400	vi	Oman, Radio Sultanate of	15355va			
0300 0310		Vatican City, Vatican Radio	7305am	9605am			0300 0400	vi	Papua New Guinea, NBC	9675do	11880do		
0300 0325		S Africa, Channel Africa	9525af				0300 0400		Russia, Voice of Russia WS	7180na	12020na	13655na	15470na
0300 0330	sm w fa	Belarus, R Belarus International	5970eu	7210eu			0300 0400		Singapore R Corp of Singapore	6150do			
0300 0330		Egypt, Radio Cairo	9475am				0300 0400	vi/as	Solomon Islands, SIBC	5020do			
0300 0330		S Africa, Adventist World Radio	9515af				0300 0400	vi/a	Solomon Islands, SIBC	9545do			
0300 0330		Thailand, Radio	15460na				0300 0400		Sri Lanka, Sri Lanka BC Corp	6005as	6075as	6130do	9770as
0300 0330	a	UK, Wales Radio Intl/Merlin	9735na						15425as	5950na	9680na	11745as	11825as
0300 0330		USA, KJES Vado NM	7555na				0300 0400		Taiwan, R Taiwan International	15345as			
0300 0330	mtwhf	USA, Voice of America	4960af				0300 0400		Uganda, Radio	4976do	5026do		
0300 0345		Germany, Deutsche Welle	6045na	9535na	9640na	9700na	0300 0400		UK, BBC World Service	3255af	5975na	6005af	6135am
			11750na						6175na	6190af	6195eu	7160af	9410eu
0300 0345	vi	Libya, Voice of Africa	11815af	15420af					11730af	11760me	11765af	11955me	12095af
									15280as	15310as	15360as	15420af	17760as
									17790as	21660as			
0300 0356		China China Radio International	9690na				0300 0400		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
0300 0400		Anguilla, Caribbean Beacon	6090am						6350va	6458va	6847va	10320va	10940va
0300 0400	vi	Australia, ABC/Alice Springs	4835do						12579va	12689va	13362va	16847va	
0300 0400	vi	Australia, ABC/Katherine	5025do				0300 0400		USA, KAIJ Dallas TX	5755va			
0300 0400	vi	Australia, ABC/Tennant Creek	4910do				0300 0400		USA, KTVN Salt Lake City UT	7510na			
0300 0400		Australia, Christian Voice	9865va	15185va	17645va	21680va	0300 0400		USA, KWHR Naalehu HI	17510as			
0300 0400		Australia, Radio	9660pa	12080pa	15240as	15415as							
			17580va										
0300 0400	mtwhf	Bhutan, Bhutan BC Service	6035do				0300 0400		USA, Voice of America	6035af	6080af	7105af	7290af
0300 0400	vi	Botswana, Radio	3356do	4820do	7255do				7340af	7415af	9575af	9885af	
0300 0400		Bulgaria, Radio	7400na	9400na			0300 0400		USA, WBCQ Monticello ME	7415na	9335na		
0300 0400		Canada, CBC Northern Service	9625do				0300 0400		USA, WEWN Birmingham AL	5825va	7425na		
0300 0400		Canada, CFRX Toronto ON	6070do				0300 0400		USA, WHRA Greenbush ME	7580na			
0300 0400		Canada, CFVP Calgary AB	6030do				0300 0400		USA, WHRI Noblesville IN	7315sa			
0300 0400		Canada, CHNX Halifax, NS	6130do				0300 0400		USA, WINB, Red Lion PA	12160om			
0300 0400		Canada, CKZN St John's NF	6160do				0300 0400		USA, WJCR Upton KY	7490va	13595as		
0300 0400		Canada, CKZU Vancouver BC	6160do				0300 0400		USA, WRMI Miami FL	7385am			
0300 0400		Costa Rica, Faro del Caribe	5054ca	6175ca	9644ca		0300 0400		USA, WSHB Cypress Crk SC	7535eu			
0300 0400		Costa Rica, R for Peace Intl	5920al	6970va	7480va	15048va	0300 0400		USA, WTJC Newport NC	9370na			
			21815irr				0300 0400		USA, WWCN Nashville TN	3215am	5070am	5935am	7435am
0300 0400		Costa Rica, University Network	5920al	6970va	7480va	15048va	0300 0400		USA, WWFV McCaysville GA	5085va	6890am		
			21815irr				0300 0400		USA, WYFR Okeechobee FL	6065na	9505na		
0300 0400		Cuba, Radio Havana	6000na	9820na	11705na		0300 0400	vi	Vanuatu, Radio	3945do	4960do	7260do	
0300 0400		Ecuador, HCJB	9745na	11840na	21455usb		0300 0400	vi	Zambia, Christian Voice	6065do			
0300 0400	a/monthly	Finland, Scandv Weekend Radio	11690va	11720va			0300 0400	vi	Zambia, National BC Corp	6165do	6265do		
0300 0400		Germany, Voice of Hope	6185na				0300 0400	vi	Zimbabwe, Zimbabwe BC Corp	4828do	6045do		
0300 0400	vi	Guatemala, Radio Cultural	3300do	5955do			0310 0315		Vatican City, Vatican Radio	7305am	9605am	9660af	
0300 0400		Guyana, Voice of	3289do	5949do			0315 0340		Vatican City, Vatican Radio	9660af			
0300 0400	sm	Honduras, Radio Luz y Vida	3250ca				0330 0357		Vietnam, Voice of	9795na			
0300 0400		Japan, Radio	17825ca	21610pa			0330 0400		Albania, R Tirana International	6115na	7160na		
0300 0400		Kenya, Kenya BC Corp	4935do				0330 0400		Hungary, Radio Budapest	9835na			
0300 0400	vi	Lesotho, Radio	4800do				0330 0400		Myanmar, Radio	9730do			
0300 0400		Liberia, Voice of Hope	6280af				0330 0400		Sweden, Radio	9495na			
0300 0400		Malaysia, Radio	7295do				0330 0400		UAE, Radio Dubai	12005na	13675na	15395na	15400na
0300 0400		Malaysia, Voice of Islam	6175as	9750as	15295as		0345 0400	f	Seychelles, FEBA Radio	11885af			
0300 0400		Namibia, Namibian BC Corp	3270af	3289af			0357 0400	vi	Malawi, Malawi BC Corp	5995do			
0300 0400		New Zealand, R New Zealand Int	17675pa										

SELECTED PROGRAMS

Newscasts (*extended)

0300	BBCWS(am)	D	World Briefing*
	China R. Int.	D	News
	Deutsche Welle	D	News
	R. Australia	D	News
	R. Habana Cuba	T-S	International News
	R. New Zealand Int.	S/A	News
	M-F		Pacific Regional News
	R. Taipei Int.	D	News
	Voice of Russia	D	News
0310	R. Habana Cuba	T-S	National News
0330	R. Budapest	D	News
	R. Habana Cuba	D	News Bulletin
	Voice of Russia	D	News in Brief
	Voice of Vietnam	D	News

Current Affairs Magazines/Features

0300	Channel Africa	M-F	Dateline Africa
0305	Deutsche Welle	S/M	Weekend Review
		T-A	Newslink
	R. Australia	S	Correspondents' Report
	R. New Zealand Int.	W	Pacific Report
		F	Dateline Pacific
0310	China R. Int.	S	Report on Developing Countries
		M-F	Current Affairs
		A	Global Review
0315	R. Habana Cuba	T-S	Viewpoint
0330	BBCWS(am)	M	Assignment
	Channel Africa	S	Network Africa
	Deutsche Welle	T	Insight (international affairs)
	R. New Zealand Int.	F	Pacific Correspondent
	R. Sweden	T-A	60 Degrees North
0340	R. Habana Cuba	M/F	Caribbean Outlook
		A	Weekly Review
0345	BBCWS(am)	T/W/F/A	News Analysis
		H	From Our Own Correspondent

Business/Economics

0311	Voice of Russia	W/A	Newmarket
0315	R. Taipei Int.	T	Taiwan Economic Journal

0330	BBCWS(am)	T-A	World Business Report
	China R. Int.	W	China Horizons
	R. New Zealand Int.	W	Tradewinds
0340	R. Budapest	M	Europe Unlimited (trade-monthly)
0345	R. Sweden	H	Money Matters
	Voice of Vietnam	F	Vietnam Economy

Science/Technology

0300	R. Habana Cuba	M	Breakthrough
0311	Voice of Russia	T/F	Science and Engineering
0315	Deutsche Welle	S	Spectrum
0330	BBCWS(am)	S	Science in Action
	Deutsche Welle	W	Man and Environment
0345	R. Sweden	F	Greenscan (ecology-2nd wk.) Heartbeat (health-3rd wk.)

Arts and Culture

0305	R. New Zealand Int.	M	Tagata o te Moana (Pacific culture)
0315	Deutsche Welle	M	Arts on the Air
0320	China R. Int.	S	In the Spotlight
0330	R. Sweden	S	Spectrum (3rd wk.)
0340	R. Budapest	M	Spotlight (monthly)
0345	Voice of Vietnam	W	Culture and Society
		A	Literature and Arts

Local Lives and Views

0305	R. Australia	A	Rural Reporter (outback)
0330	China R. Int.	M	People in the Know
		F	Life in China
	Deutsche Welle	H	Living in Germany
	R. Sweden	S	Weekend (Europe magazine-1st wk.) Sweden Today (2nd wk) Studio 49 (topical discussion-4th wk.)
			Women in Taiwan
	R. Taipei Int.	M	Life Unusual
		H	Carol's Cafe
0332	Voice of Russia	M	This is Russia
		T	Kaleidoscope (events)
		H	Moscow Yesterday and Today

0335	R. Budapest	M	Heading for Hungary
		T-A	Hungary Today
	Voice of Vietnam	D	Current Affairs
0340	Voice of Vietnam	S	Weekly Review
		T/W/F/S/Press	Review
		A	Talk of the Week
0345	R. Sweden	F	Nordic Report (1st wk.) The S-Files (things Swedish-4th wk)
		A	Review of the Newswest
	Voice of Vietnam	T	Vietnam: Land and People
		A	Rural Vietnam
0354	Voice of Russia	W	Russia: People and Events

Informational Features

0305	R. New Zealand Int.	S	A Question of Religion
0315	R. Taipei Int.	S	Instant Noodles
		M	Life on the Outside
		H	Soundbite
		A	Naluwan
0320	China R. Int.	H	Voices from Other Lands
0330	Deutsche Welle	A	German by Radio
0332	Voice of Russia	F	Russian by Radio
0340	R. Australia	A	Lingua Franca (about language)

Music

0305	R. New Zealand Int.	T	Top 5 (pop/rock)
		A	Musical feature or series
0315	HCJB	T-A	Rendezvous (inspirational)
	R. Taipei Int.	W	Floating Air (traditional)
		F	Miss Mook's Big Countdown
0330	HCJB	A	Inspirational Classics
	R. Habana Cuba	M	From Havana (Cuban musicians)
	R. New Zealand Int.	T	New Releases
	R. Sweden	M	Sounds Nordic (rock-ex. 1st wk.)
	R. Taipei Int.	T	Formosa Oldies
0332	Voice of Russia	S	Songs from Russia
		W	Russian Musical Highlights (history)
0345	HCJB	W	Wonderful Words of Life (hymns)
0350	Voice of Vietnam	S	Music (Vietnamese)

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FREQUENCIES

0400 0427	Czech Rep, Radio Prague Intl	7345na	7385na	9435na	0400 0500	Singapore R Corp of Singapore	6150do		
0400 0430	Belgium, Radio Vlaanderen Intl	11985am			0400 0500	Solomon Islands, SIBC	5020do		
0400 0430	Mexico, R Mexico International	9705am	11770am		0400 0500	Solomon Islands, SIBC	9545do		
0400 0430	Mongolia, Voice of	12015as	12085as		0400 0500	Switzerland, Swiss R International	9885am	9905am	
0400 0430	Nigeria, Radio/Kaduna	6090do	7275do		0400 0500	Turkey, Voice of	7240as	9655as	21715as
0400 0430	S Africa, Channel Africa	5955af			0400 0500	Uganda, Radio	4976do	5026do	
0400 0430	Sri Lanka, Sri Lanka BC Corp	6005as	6075as	6130do 9770as	0400 0500	UK, BBC World Service	3255af	5975na	6005af 6005af
		15425as					6175na	6190af	7160af
0400 0445	Germany, Deutsche Welle	7280af	9565af	11935af 11965af			11760me	11765af	12095af
0400 0455	USA, WYFR Okeechobee FL	6065na	9355eu	9505na			15310as	15420af	15575me
0400 0456	China China Radio International	9730na					21660as	21830me	
0400 0456	Romania, R Romania International	9570na	11830na	15335as 17735as	0400 0500	Ukraine, R Ukraine International	9610na	9835na	
		15335			0400 0500	USA, Armed Forces Radio	4278va	4319va	4993va 5765va
0400 0500	Anguilla, Caribbean Beacon	6090am					6350va	6458va	6847va 10320va
0400 0500	Australia, ABC/Alice Springs	4835do					12689va	13362va	16847va
0400 0500	Australia, ABC/Katherine	5025do			0400 0500	USA, KAU Dallas TX	5755va		
0400 0500	Australia, ABC/Tennant Creek	4910do			0400 0500	USA, KTBN Salt Lake City UT	7510na		
0400 0500	Australia, Christian Voice	9865va	15185va	17645va 21680va	0400 0500	USA, KVOH Los Angeles CA	9975am		
0400 0500	Australia, Radio	9660pa	12080pa	15240as 15415as	0400 0500	USA, KWHR Naalehu HI	17780as		
		15515va	17750as	21725va	0400 0500	USA, Voice of America	6080af	7170af	7290af 7415af
0400 0500	Botswana, Radio	3356do	4820do	7255do			9575af	9775af	9885af
0400 0500	Cameron, RTV/Yaounde	4850do			0400 0500	USA, WBCQ Monticello ME	7415na	9335na	
0400 0500	Canada, CBC Northern Service	9625do			0400 0500	USA, WEWN Birmingham AL	5825va	7425na	
0400 0500	Canada, CFRX Toronto ON	6070do			0400 0500	USA, WHRA Greenbush ME	7580na		
0400 0500	Canada, CFVP Calgary AB	6030do			0400 0500	USA, WHRI Noblesville IN	7315sa		
0400 0500	Canada, CHNX Halifax, NS	6130do			0400 0500	USA, WINB Red Lion PA	12160am		
0400 0500	Canada, CKZN St John's NF	6160do			0400 0500	USA, WJCR Upton KY	7490va	13595as	
0400 0500	Canada, CKZU Vancouver BC	6160do			0400 0500	USA, WMLK Bethel PA	7555va	9465alt	
0400 0500	Costa Rica, R for Peace Intl	5920al	6970va	7480va 15048va	0400 0500	USA, WRMI Miami FL	7385am		
0400 0500	Costa Rica, University Network	5920al	6970va	7480va 15048va	0400 0500	USA, WSHB Cypress Crk SC	7535eu	12020af	
0400 0500	Cuba, Radio Havana	6000na	9820na	11705na	0400 0500	USA, WTJC Newport NC	9370na		
0400 0500	Ecuador, HCJB	9745na	11840na	21455usb	0400 0500	USA, WWCR Nashville TN	2390am	3215am	5070am 5935am
0400 0500	Finland, Scandv Weekend Radio	11690va	11720va		0400 0500	USA, WWFV McCaysville GA	5085va	6890am	
0400 0500	Germany, Voice of Hope	6185na			0400 0500	Zambia, Christian Voice	6065do		
0400 0500	Guatemala, Radio Cultural	3300do	5955do		0400 0500				
0400 0500	Guyana, Voice of	3289do	5949do		0400 0500				
0400 0500	Kenya, Kenya BC Corp	4935do			0400 0500				
0400 0500	Lesotho, Radio	4800do			0400 0500				
0400 0500	Liberia, Voice of Hope	6280af			0400 0500				
0400 0500	Malawi, Malawi BC Corp	3380do	5995do		0400 0500				
0400 0500	Malaysia, Radio	7295do			0400 0500				
0400 0500	Malaysia, Voice of Islam	6175as	9750as	15295as	0400 0500				
0400 0500	Myanmar, Radio	9730do			0400 0500				
0400 0500	Namibia, Namibian BC Corp	3270af	3289af		0400 0500				
0400 0500	New Zealand, R New Zealand Int	17675pa			0400 0500				
0400 0500	New Zealand, ZLXA	3935do	7290do		0400 0500				
0400 0500	Nigeria, Radio/Enugu	6025do			0400 0500				
0400 0500	Papua New Guinea, NBC	9675do	11880do		0400 0500				
0400 0500	Russia, Voice of Russia WS	7125na	7180na	12000na 12020na	0400 0500				
		13665na	15445na	15470na 15595na 17595na	0400 0500				

SELECTED PROGRAMS

Newscasts (*extended)

0400	BBCWS(am)	S/M	The World Today*
		T-A	News
	China R. Int.	D	News
	HCJB	D	Latin American & World News
	R. Australia	D	News
	R. Habana Cuba	T-S	International News
	R. New Zealand Int.	D	News
	R. Prague	D	News
	R. Vlaanderen Int.	T-S	News
	Voice of Russia	D	News
0430	R. Habana Cuba	T-S	News Bulletin
	R. Netherlands	S/M	News
	Voice of Russia	D	News in Brief

Current Affairs Magazines/Features

0400	Channel Africa	S	Network Africa (week in review)
		M-F	Dateline Africa
	R. Habana Cuba	M	Weekly Review
0405	R. New Zealand Int.	M-F	Checkpoint
0410	China R. Int.	S	Report on Developing Countries
		M-F	Current Affairs
		A	Global Review
	HCJB	T-A	Studio 9 (on Latin America)
	R. Australia	M-F	The World Today
	R. Habana Cuba	T-A	Spotlight on the Americas
0411	Voice of Russia	M	Sunday Panorama
		T-A	News & Views
0430	R. Australia	A	Asia Pacific
	R. Netherlands	T-A	Newsline
0455	R. Netherlands	S	Insight (commentary)

Business/Economics

0413	R. Vlaanderen Int.	F	Economics
0415	Swiss R. Int.	A	Business Spotlight
0420	R. Prague	F	Economic Report
0430	BBCWS(am)	S	Global Business
	China R. Int.	W	China Horizons
0445	Swiss R. Int.	A	Business Spotlight

Science/Technology

0405	R. Australia	S	Ockham's Razor (opinion)
		A	Pacific Focus-Environment
0413	R. Vlaanderen Int.	W	Green Society (ecology)
0430	BBCWS(am)	T	Body & Mind (health)

Arts and Culture

0405	R. New Zealand Int.	S	Whenua! (Maori culture)
		A	Tagata o te Moana (Pacific culture)
	R. Prague	S	The Arts
		M	Readings from Czech Literature
0413	R. Vlaanderen Int.	H/A	Around the Arts
0415	Swiss R. Int.	H	Book Zone (2nd wk.)
0420	China R. Int.	S	In the Spotlight
0430	Voice of Russia	W/F	Russian history/culture program
0445	Swiss R. Int.	H	Book Zone (2nd wk.)

Local Lives and Views

0400	Swiss R. Int.	D	Newsnet (Swiss magazine)
0404	R. Vlaanderen Int.	T-A	Belgium Today
0405	R. Prague	M	Letter from Prague
		T-A	Current Affairs
0408	R. Vlaanderen Int.	M	Tourism in Flanders
		T-A	Press Review
0410	R. Prague	M	From the Weeklies
	Swiss R. Int.	S	The Name Game (geo quiz-1st wk.)
		M	Swiss Scene
0413	R. Vlaanderen Int.	T	Focus on Europe
0415	R. Prague	T	Spotlight (Czech current events) or
		H	One on One (interview)
		H	Czechs in History or
		H	Central Europe Today
0418	R. Vlaanderen Int.	H	Around Town
		A	Tourism in Flanders
0420	R. Prague	W	Talking Point
0424	Voice of Russia	M	Russia: People and Events
0430	China R. Int.	M	People in the Know
		F	Life in China
	Swiss R. Int.	D	Newsnet (Swiss magazine)

0432	Voice of Russia	S	Kaleidoscope (Russian events)
0435	R. Netherlands	S	Europe Unzipped
0440	Swiss R. Int.	S	The Name Game (geo quiz-1st wk.)
		M	Swiss Scene

Informational Features

0405	BBCWS(am)	T	Omnibus (documentary)
0410	R. Habana Cuba	S	The World of Stamps
0418	R. Vlaanderen Int.	F	International Report
0420	China R. Int.	H	Voices from Other Lands
0430	BBCWS(am)	W	Patterns of Faith
		H	Plain English (on language)
		F	Heart and Soul (religion)
0432	Voice of Russia	T/H/S	20th Century

Music

0400	R. Vlaanderen Int.	S	Music from Flanders
0405	BBCWS(am)	W	The Alternative (rock)
		H	The Greenfield Collection (classical requests)
		F	Jazzmatazz
	WHRI(7315 kHz)	S/A	20: The Countdown Magazine (Christian rock)
0410	R. Prague	S	Saturday Music (classical/folk/jazz)
	Swiss R. Int.	S	Sounds Good (Swiss music-3rd/5th)
0424	R. Vlaanderen Int.	M-A	Soundbox (Flemish rock)
0430	HCJB	A	Musica del Ecuador
	R. Australia	S	Oz Sounds
0440	Swiss R. Int.	S	Sounds Good (Swiss music-3rd/5th)

Entertainment/Variety, Magazine Shows

0400	WBCQ(7415 kHz)	S	Le Bon Bon Club
0405	BBCWS(am)	A	Panel game or quiz show
0430	BBCWS(am)	M	Westway (drama serial)
0432	Vocie of Russia	M	Audio Book Club
0445	BBCWS(am)	T-A	Off the Shelf (book readings)

SWL, Media and Communications

0400	R. Vlaanderen Int.	M	Radio World
	WHRI(5745 kHz)	S	Dixing with Cumbre
	WWCR(5070 kHz)	S	Spectrum

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FREQUENCIES

0500	0505	USA, WWCN Nashville TN	2390am	5070am	5935am	0500	0600	vi	Nigeria, Radio/Ibadan	6050do		
0500	0505	sm USA, WWCN Nashville TN	3210am			0500	0600	vi	Nigeria, Radio/Kaduna	4770do	6090do	7275do 9570do
0500	0505	twfha USA, WWCN Nashville TN	3215am			0500	0600	vi	Nigeria, Radio/Lagos	3326do	4990do	
0500	0515	Israel, Kol Israel	6280va	9435va	17545va	0500	0600	vi	Nigeria, Voice of	7255af	15120af	
0500	0530	Australia, Christian Voice	9865va	15185va	17645va 21680va	0500	0600	vi	Papua New Guinea, NBC	9675do	11880do	
0500	0530	twfha Mexico, R Mexico International	9705am	11770am		0500	0600	vi	Russia, Voice of Russia WS	7125na	7180na	12020na 15445na
0500	0530	Netherlands, Radio	6165na	9590na					15470na	15595na		
0500	0530	S Africa, Adventist World Radio	5960af	6015af		0500	0600	mtwhfa	Russia, Voice of Russia WS	12000na		
0500	0530	S Africa, Channel Africa	15215af			0500	0600	mtwhfs	S Africa, Trans World Radio	7200as		
0500	0530	Switzerland, Swiss R International	9655eu			0500	0600		Singapore R Corp of Singapore	6150do		
0500	0530	Uganda, Radio	4976do	5026do		0500	0600	vi	Solomon Islands, SIBC	5020do	9545do	
0500	0530	Vatican City, Vatican Radio	9660af	11625af	15570af	0500	0600		Spain, R Exterior Espana	6055na		
0500	0530	vi Zimbabwe, Zimbabwe BC Corp	4828do	6045do		0500	0600		Sri Lanka, Sri Lanka BC Corp	6130do		
0500	0545	Germany, Deutsche Welle	5960na	6120na	9670na 11795na	0500	0600		Swaziland, Trans World Radio	6035af	7200af	9500af
0500	0556	China China Radio International	9560na			0500	0600		UK, BBC World Service	5975na	6005af	6175am 6190af
0500	0559	Canada, R Canada International	9760af	11850af	11905me				6195eu	7160af	9410eu	9740as 11760me
0500	0600	Anguilla, Caribbean Beacon	6090am						11765af	11940af	11955pa	15280as
0500	0600	vi Australia, ABC/Alice Springs	4835do						15360as	15420as	15575me	17640af 17760as
0500	0600	vi Australia, ABC/Katherine	5025do			0500	0600		17790as	21660as		
0500	0600	vi Australia, ABC/Tennant Creek	4910do			0500	0600		USA, Armed Forces Radio	4278va	4319va	4993va 5765va
0500	0600	Australia, Radio	9660pa	12080pa	15240as 15515va				6350va	6458va	6847va	10320va 10940va
		17580va	21725va			0500	0600		12689va	13362va	16847va	
0500	0600	as Australia, Radio	17750as			0500	0600		USA, KAIJ Dallas TX	5755va		
0500	0600	vi Botswana, Radio	3356do	4820do	7255do	0500	0600		USA, KTBN Salt Lake City UT	7510na		
0500	0600	vi Cameroon, RTV/Yaounde	4850do			0500	0600		USA, KVOH Los Angeles CA	9975am		
0500	0600	Canada, CBC Northern Service	9625do			0500	0600		USA, KWHR Naalehu HI	11565pa	17780as	
0500	0600	Canada, CFRX Toronto ON	6070do			0500	0600		USA, Voice of America	5970af	6035af	6080af 7170af
0500	0600	Canada, CFVP Calgary AB	6030do						7295af	9770af	11825eu	12080af
0500	0600	Canada, CHNX Halifax, NS	6130do			0500	0600		15205as			
0500	0600	Canada, CKZN St John's NF	6160do			0500	0600		USA, WBCQ Monticello ME	7415na	9330na	
0500	0600	Canada, CKZU Vancouver BC	6160do			0500	0600		USA, WEWN Birmingham AL	5825va	7425na	
0500	0600	Costa Rica, R for Peace Intl	5920al	6970va	7480va 15048va	0500	0600		USA, WHRA Greenbush ME	7435af		
0500	0600	Costa Rica, University Network	5920al	6970va	7480va 15048va	0500	0600		USA, WHRI Noblesville IN	7315sa		
0500	0600	Cuba, Radio Havana	9550na	9820na	9830na	0500	0600		USA, WJCR Upton KY	7490va	13595as	
0500	0600	Ecuador, HCJB	9745na	11840na	21455usb	0500	0600		USA, WMLK Bethel PA	7555va	9465alt	
0500	0600	a/monthly Finland, Scandv Weekend Radio	11690va	11720va		0500	0600		USA, WRMI Miami FL	7385am		
0500	0600	Guyana, Voice of	3289do	5949do		0500	0600		USA, WSHB Cypress Crk SC	7535eu	15195af	
0500	0600	Japan, Radio	5975eu	6110na	7230eu 11715as	0500	0600		USA, WTJC Newport NC	9370na		
		11760as	15150as	17810as	21755pa	0500	0600		USA, WWFV McCaysville GA	5085va	6890am	
0500	0600	Kenya, Kenya BC Corp	4935do			0500	0600		USA, WYFR Okeechobee FL	5985na	9355eu	11550eu
0500	0600	Kuwait, Radio	15110va			0500	0600	vi	Vanuatu, Radio	3945do	4960do	7260do
0500	0600	vi Lesotho, Radio	4800do			0500	0600		Zambia, Christian Voice	6065do		
0500	0600	vi Liberia, R Liberia International	5100do			0500	0600	vi	Zambia, National BC Corp	6165do	6265do	
0500	0600	Liberia, Voice of Hope	6280af			0502	0600		S Africa, Trans World Radio	9500af		
0500	0600	vi Malawi, Malawi BC Corp	3380do	5995do		0505	0600		USA, WWCN Nashville TN	2390am	3210am	5070am 5935am
0500	0600	Malaysia, Radio	7295do			0515	0525		Rwanda, Radio	6055do		
0500	0600	Malaysia, RTM Sarawak	7160do			0525	0600	vi	Ghana, Ghana BC Corp	3366do	4915do	
0500	0600	Malaysia, Voice of Islam	6175as	9750as	15295as	0530	0600	vi	Italy, IRRS	3985va		
0500	0600	Myanmar, Radio	9730do			0530	0600		Thailand, Radio	15115eu		
0500	0600	Namibia, Namibian BC Corp	3270af	3289af		0530	0600		UAE, Radio Dubai	13675au	15435au	21700au
0500	0600	New Zealand, R New Zealand Int	17675pa			0530	0600	smtwhf	UK, BBC World Service	17885af		
0500	0600	New Zealand, ZLXA	3935do	7290do		0530	0600	vi	Zimbabwe, Zimbabwe BC Corp	5975do	6045do	
0500	0600	vi Nigeria, Radio/Enugu	6025do									

SELECTED PROGRAMS

Newscasts (*extended)

0500	BBCWS(am)	S	News
	China R. Int.	D	The World Today*
	Deutsche Welle	D	News
	R. Australia	D	News
	R. Habana Cuba	T-A	International News
	R. Japan	D	News
	R. New Zealand Int.	D	News
	Spanish Foreign R.	T-A	Ibero-American News*
	Voice of Russia	D	News
0510	R. Habana Cuba	T-A	National News
0530	R. Habana Cuba	T-A	News Bulletin
	Voice of Nigeria	S/A	News
	Voice of Russia	D	News in Brief

Current Affairs Magazines/Features

0500	Channel Africa	S	Network Africa (week in review)
		M-F	Dateline Africa
0505	Deutsche Welle	S	Talking Point (journalists)
		T-A	Newslink
	R. Australia	S	Pacific Review
0505	R. New Zealand Int.	M-F	Worldwatch
0510	China R. Int.	S	Report on Developing Countries
		M-F	Current Affairs
		A	Global Review
	R. Australia	M-F	Pacific Beat
	R. Japan	S	Roundup Asia
0515	R. Habana Cuba	T-S	Viewpoint
	R. Japan	M-F	44 Minutes
0530	Deutsche Welle	T	Insight (international affairs)
	R. New Zealand Int.	M	Letter from America
		F	The Pacific Report
	Voice of Nigeria	M-F	VON Scope
0540	R. Habana Cuba	M/F	Caribbean Outlook
		A	Weekly Review

Business/Economics

0500	R. Netherlands	A	A Good Life (development)
0511	Voice of Russia	H	Newmarket
0515	Deutsche Welle	S	Marks and Markets
0530	China R. Int.	W	China Horizons

Science/Technology

0500	R. Netherlands	T	Research File
0511	Voice of Russia	W/A	Science and Engineering
0530	Deutsche Welle	W	Man and Environment
	WWCR(5070 kHz)	M	New Horizons

Arts and Culture

0520	China R. Int.	S	In the Spotlight
0535	Spanish Foreign R.	T	Entertainment in Spain
		F	Arts in Spain

Local Lives and Views

0500	R. Netherlands	M	Dutch Horizons
	Spanish Foreign R.	S	Visitors Book
		M	Window on Spain
0505	R. New Zealand Int.	A	Focus on Politics
0515	Spanish Foreign R.	M	Entrepreneur (food/tourism)
0532	Spanish Foreign R.	T-A	Press Review
0530	China R. Int.	M	People in the Know
		F	Life in China
	Deutsche Welle	H	Living in Germany
	R. Australia	S	In Conversation-Rural
	R. New Zealand Int.	T-H	Today in Parliament
0532	Voice of Russia	S	Moscow Yesterday and Today
0535	Spanish Foreign R.	W	Kaleidoscope (life in Spain)
0546	Voice of Russia	W	Russia: People and Events

Informational Features

0500	HCJB	W	The Book & the Spade (archaeology)
	R. Netherlands	S	Sound Fountain (soundscape)

		H	Documentary
		F	Encore (best of RN)
		S	Reflections (meditation)
0505	Deutsche Welle	M	Religion and Society
0515	Deutsche Welle	M	Cool (teen magazine)
	Spanish Foreign R.	S	American Chronicles
0530	China R. Int.	H	Voices from Other Lands
	Deutsche Welle	A	German by Radio
	R. Australia	A	Educational series
0532	Spanish Foreign R.	S	Spain in the American West
0535	Spanish Foreign R.	H	As Others See Us
0547	Spanish Foreign R.	T-A	Spanish Language Course
0555	R. New Zealand Int.	D	Golden Kiwis (notable NZ people)

Music

0500	HCJB	F	Inspirational Classics
	A	F	Walkin' in the Sunshine (country)
	R. Habana Cuba	M	Top Tens (Cuban hits)
	R. Netherlands	W	Music 52-15 (international)
	Voice of Nigeria	M-F	Wave Train
		A	African Safari
	WHRI(7315 kHz)	S	20: The Countdown Magazine (Christian rock)
	WWCR(3210 kHz)	T-S	Worldwide Country Radio
0505	BBCWS(am)	S	Wright Around the World (pop requests)
	Voice of Nigeria	S	Link-Up (requests)
0511	Voice of Russia	S/M	Russian Musical Highlights (history)
0529	Spanish Foreign R.	M	Flamenco
		T-A	Spanish Pop Music
0530	R. Habana Cuba	M	The Jazz Show
	R. New Zealand Int.	A	In a Mellow Tone
0532	Voice of Russia	M	Jazz Show
		T	Yours for the Asking
		W	Russian Musical Highlights (history)
		H	Folk Box
0546	Voice of Russia	T	Music At Your Request

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0600	0615		Canada, CBC Northern Service	9625do					0600	0700	vl	Nigeria, Radio/Lagos	3326do	4990do		
0600	0615		S Africa, Trans World Radio	11640af					0600	0700	vl	Nigeria, Voice of	7255af	15120af		
0600	0620		Vatican City, Vatican Radio	4005eu	5883eu	7250eu			0600	0700	vl	Papua New Guinea, NBC	9675do	11880do		
0600	0629		Canada, R Canada International	6045eu	6150eu	9780eu			0600	0700		Romania, R Romania International	9530na	11830na		
0600	0630		S Africa, Channel Africa	15215af					0600	0700		Russia, Voice of Russia WS	15460au	15470au	15525au	17570au
0600	0630		Switzerland, Swiss R International	9655eu								17655au	21790au			
0600	0630		USA, Voice of America	5970af	5995af	6035af	6080af		0600	0700	mtwhf	S Africa, Trans World Radio	6035af			
			7170af	7295af	11805af	11825eu	11930af		0600	0700	a	S. Africa, Trans World Radio	7200af	9500af		
			12080af	15205as	15600af				0600	0700		Sierra Leone, Sierra Leone BS	3316do			
0600	0645		Germany, Deutsche Welle	7225af	9565af	11785af			0600	0700		Singapore R Corp of Singapore	6150do			
0600	0700		Anguilla, Caribbean Beacon	6090am					0600	0700	vl	Solomon Islands, SIBC	5020do	9545do		
0600	0700	vl	Australia, ABC/Alice Springs	4835do					0600	0700		Sri Lanka, Sri Lanka BC Corp	6130do			
0600	0700	vl	Australia, ABC/Katherine	5025do					0600	0700		Swaziland, Trans World Radio	6035af	7200af	9500af	
0600	0700	vl	Australia, ABC/Tennant Creek	4910do					0600	0700		Uganda, Radio	5026do	7110do	7196do	
0600	0700		Australia, Radio	9660pa	12080pa	15240as	15415as		0600	0700		UK, BBC World Service	6055af	6175am	6190af	6195eu
			15515va	17580as	17750as	21725va						9410eu	9580pa	9740as	11760me	
0600	0700	vl	Botswana, Radio	7255do	9600do	7255do						11765af	11940af	11955pa	12095eu	15310as
0600	0700	vl	Cameroon, RTV/Yaounde	4850do								15360as	15420af	15420af	15575me	17640af
0600	0700		Canada, CFRX Toronto ON	6070do					0600	0700		17760as	17790as	17885af	21660as	
0600	0700		Canada, CFVP Calgary AB	6030do					0600	0700		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
0600	0700		Canada, CHNX Halifax, NS	6130do								6350va	6458va	6847va	10320va	10940va
0600	0700		Canada, CKZN St John's NF	6160do								12579va	12689va	13362va	16847va	
0600	0700		Canada, CKZU Vancouver BC	6160do					0600	0700		USA, KAIJ Dallas TX	5755va			
0600	0700		Costa Rica, R for Peace Intl	5920al	6970va	7480va	15048irr		0600	0700		USA, KTBN Salt Lake City UT	7510na			
0600	0700		Costa Rica, University Network	5920al	6970va	7480va	15048irr		0600	0700		USA, KVOH Los Angeles CA	9975am			
0600	0700		Cuba, Radio Havana	9550na	9820na	9830na			0600	0700		USA, KWHR Naalehu HI	11565pa	17780as		
0600	0700		Ecuador, HCJB	9745na	11840na	21455usb			0600	0700		USA, WBCQ Monticello ME	7415na			
0600	0700	a/monthly	Finland, Scandv Weekend Radio	11690va	11720va				0600	0700		USA, WEWN Birmingham AL	5825va	7425na		
0600	0700		Germany, Deutsche Welle	6140eu					0600	0700		USA, WHRA Greenbush ME	7435af			
0600	0700	vl	Ghana, Ghana BC Corp	3366do	4915do				0600	0700		USA, WHRI Noblesville IN	7315sa			
0600	0700		Guyana, Voice of	3289do	5949do				0600	0700		USA, WJCR Upton KY	7490va	13595as		
0600	0700	vl														

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FREQUENCIES

0700	0705		New Zealand, R New Zealand Int	17675pa					0800	0810	vl	Malawi, Malawi BC Corp	3380do	5995do		
0700	0720	a	S Africa, Trans World Radio	7200af	9500af				0800	0825		Malaysia, Voice of	6275as	9750as	15295as	
0700	0720		Swaziland, Trans World Radio	6035af	7200af	9500af			0800	0827		Czech Rep, Radio Prague Intl	11600eu	15255eu		
0700	0730	mtwhfa	Malta, Voice of Mediterranean	6010eu					0800	0830	vl	Australia, ABC/Alice Springs	4835do			
0700	0730	vl	Papua New Guinea, NBC	9675do	11880do				0800	0830	vl	Australia, ABC/Katherine	5025do			
0700	0730		Slovakia, R Slovakia International	15460au	17550au	21705au			0800	0830	vl	Australia, ABC/Tennant Creek	4910do			
0700	0730	a	USA, Voice of America	6873va					0800	0830		Belgium, Radio Vlaanderen Intl	5985eu			
0700	0735	mtwhf	S Africa, Trans World Radio	6035af	9500af				0800	0830		Myanmar, Radio	9730do			
0700	0745	as	UK, BBC World Service	17885af					0800	0900		Anguilla, Caribbean Beacon	6090am			
0700	0745		USA, WYFR Okeechobee FL	7355eu	9985eu	11850eu			0800	0900		Australia, Radio	5995pa	9580va	9710as	12080pa
0700	0756		Romania, R Romania International	17720af	21480af								13605va	15240va	15415as	17750as
0700	0800		Anguilla, Caribbean Beacon	6090am									21725va			
0700	0800	vl	Australia, ABC/Alice Springs	4835do					0800	0900	mtwhf	Bhutan, Bhutan BC Service	6035do			
0700	0800	vl	Australia, ABC/Katherine	5025do					0800	0900	vl	Botswana, Radio	7255do	9600do	7255do	
0700	0800	vl	Australia, ABC/Tennant Creek	4910do					0800	0900	vl	Cameroon, RTV/Yaounde	4850do			
0700	0800		Australia, Radio	9660pa	12080pa	15240as	15415as		0800	0900		Canada, CFRX Toronto ON	6070do			
			17580va	21725va	9600do	7255do			0800	0900		Canada, CFVP Calgary AB	6030do			
0700	0800	vl	Botswana, Radio	7255do												
0700	0800	vl	Cameroon, RTV/Yaounde	4850do					0800	0900		Canada, CHNX Halifax, NS	6130do			
0700	0800		Canada, CFRX Toronto ON	6070do					0800	0900		Canada, CKZN St John's NF	6160do			
0700	0800		Canada, CFVP Calgary AB	6030do					0800	0900		Canada, CKZU Vancouver BC	6160do			
0700	0800		Canada, CHNX Halifax, NS	6130do					0800	0900		Costa Rica, R for Peace Intl	5920al	6970va	15048irr	
0700	0800		Canada, CKZN St John's NF	6160do					0800	0900		Costa Rica, University Network	5920al	6970va	15048irr	
0700	0800		Canada, CKZU Vancouver BC	6160do					0800	0900		Ecuador, HCJB	9780eu	11755pa	21455usb	
0700	0800		Costa Rica, R for Peace Intl	5920al	6970va	7480va	15048irr		0800	0900	mtwhf	Eqt Guinea, Radio Africa	15185af			
0700	0800		Costa Rica, University Network	5920al	6970va	7480va	15048irr		0800	0900	as/vl	Eqt. Guinea, Radio East Africa	15185af			
0700	0800		Ecuador, HCJB	9780eu	11755pa	21455usb			0800	0900	a/monthly	Finland, Scandv Weekend Radio	11690va	11720va		
0700	0800	mtwhf	Eqt Guinea, Radio Africa	15185af					0800	0900		Germany, Deutsche Welle	6140eu			
0700	0800	as/vl	Eqt. Guinea, Radio East Africa	15185af					0800	0900		Germany, Trans World Radio	12070eu			
0700	0800	a/monthly	Finland, Scandv Weekend Radio	11690va	11720va				0800	0900		Germany, Voice of Hope	5975eu	21590me		
0700	0800		Germany, Deutsche Welle	6140eu					0800	0900		Ghana, Ghana BC Corp	3366do	4915do		
0700	0800		Germany, Voice of Hope	5975eu	21590me				0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915do		
0700	0800	vl	Ghana, Ghana BC Corp	3366do	4915do				0800	0900	as	Guam, Trans World Radio	15200as	15330as		
0700	0800		Guyana, Voice of	3289do	5949do				0800	0900		Guyana, Voice of	3289do	5949do		
0700	0800	vl/mtwhf	Italy, IRRS	7120va					0800	0900		Indonesia, Voice of	9525va	11785va	15149va	
0700	0800		Kenya, Kenya BC Corp	4935do					0800	0900	vl/as	Italy, IRRS	7120va			
0700	0800		Kuwait, Radio	15110va					0800	0900		Kenya, Kenya BC Corp	4935do			
0700	0800	vl	Lesotho, Radio	4800do					0800	0900	vl	Lesotho, Radio	4800do			
0700	0800	vl	Liberia, ELWA	4760do					0800	0900	vl	Liberia, ELWA	4760do			
0700	0800	vl	Liberia, R Liberia International	5100do					0800	0900	vl	Liberia, R Liberia International	5100do			
0700	0800		Liberia, Voice of Hope	6280af					0800	0900	vl	Liberia, Voice of Hope	6280af			
0700	0800	vl	Malawi, Malawi BC Corp	3380do	5995do				0800	0900		Malaysia, Radio	7295do			
0700	0800		Malaysia, Radio	7295do					0800	0900		Monaco, Trans World Radio	9870eu			
0700	0800		Malaysia, RTM Sarawak	7160do					0800	0900		Namibia, Namibian BC Corp	7165af	7215af		
0700	0800		Malaysia, Voice of	6275as	9750as	15295as			0800	0900		New Zealand, R New Zealand Int	15175as			
0700	0800		Myanmar, Radio	9730do					0800	0900		New Zealand, ZLXA	3935do	7290do		
0700	0800		Namibia, Namibian BC Corp	3270af	3289af				0800	0900	vl	Nigeria, Radio/Enugu	6025do			
0700	0800	vl	New Zealand, ZLXA	3935do	7290do				0800	0900	vl	Nigeria, Radio/Ibadan	6050do			
0700	0800	vl	Nigeria, Radio/Enugu	6025do					0800	0900	vl	Nigeria, Radio/Ibadan	6050do			
0700	0800	vl	Nigeria, Radio/Ibadan	6050do					0800	0900	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
0700	0800	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do		0800	0900	vl	Nigeria, Radio/Lagos	3326do	4990do		
0700	0800		Nigeria, Radio/Lagos	3326do	4990do				0800	0900	vl	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as
0700	0800		Palau, KHBN/Voice of Hope	9965as	9985as	15725as			0800	0900	vl	Papua New Guinea, NBC	4890do	9675do		
0700	0800		Russia, Voice of Russia WS	15460au	15460au	17570au	17655au		0800	0900		Russia, Voice of Russia WS	9905au	15460au	15470au	17495au
			21790au										17525au	17570au	17655au	
0700	0800		Sierra Leone, Sierra Leone BS	3316do					0800	0900	s	S Africa, Amateur Radio League	9750af			
0700	0800	vl	Singapore R Corp of Singapore	6150do					0800	0900		Sierra Leone, Sierra Leone BS	3316do			
0700	0800		Solomon Islands, SIBC	5020do	9545do				0800	0900	vl	Singapore R Corp of Singapore	6150do			
0700	0800		Sri Lanka, Sri Lanka BC Corp	6130do					0800	0900	vl	Solomon Islands, SIBC	5020do			
									0800	0900		Sri Lanka, Sri Lanka BC Corp	6130do			
0700	0800		Taiwan, R Taiwan International	5950na	9680na	11745as			0800	0900		Uganda, Radio	5026do	7110do	7196do	
0700	0800		Uganda, Radio	5026do	7110do	7196do			0800	0900		UK, BBC World Service	6190af	9410eu	9740as	11940af
0700	0800		UK, BBC World Service	6175am	6190af	9410eu	9580pa		0800	0900			11955pa	12095eu	15310as	15360as
			9740as	11760me	11765af	11940af	11955pa		0800	0900			15400af	15485eu	15565eu	17640eu
			12095eu	15310as	15360as	15400af	15485eu						17760as	17830af	21660as	21830me
			15565eu	17640eu	17760as	17790as	17830af		0800	0900	as	UK, BBC World Service	15575as	17885af		
0700	0800		USA, Armed Forces Radio	4278va	4319va	4993va	5765va		0800	0900		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
			6350va	6458va	6847va	10320va	10940va		0800	0900			6350va	6458va	6847va	10320va
			12579va	12689va	13362va	16847va							10940va	12579va	12689va	13362va
0700	0800		USA, KAIJ Dallas TX	5755va												
0700	0800		USA, KTNB Salt Lake City UT	7510na					0800	0900		USA, KAIJ Dallas TX	5755va			
0700	0800		USA, KWHR Naalehu HI	11565pa					0800	0900		USA, KNLS Anchor Point AK	9615as			
0700	0800		USA, WENW Birmingham AL	5825va	17780as				0800	0900		USA, KTNB Salt Lake City UT	7510na			
0700	0800		USA, WHRA Greenbush ME	7435af	7425na				0800	0900		USA, KWHR Naalehu HI	11565pa			
0700	0800		USA, WHRI Noblesville IN	7315sa					0800	0900		USA, Voice of America	11995as	13615as	15150as	
0700	0800		USA, WJCR Upton KY	7490va	13595as				0800	0900		USA, WENW Birmingham AL	5825va	7425na		
0700	0800		USA, WMLK Bethel PA	7555va	9465alt				0800	0900		USA, WHRA Greenbush ME	7435af			
0700	0800		USA, WRMI Miami FL	7385am												
0700	0800		USA, WSHB Cypress Crk SC	7535af					0800	0900		USA, WHRI Noblesville IN	7315sa			
0700	0800		USA, WTJC Newport NC	9370na					0800	0900		USA, WJCR Upton KY	7490va	13595as		
0700	0800		USA, WWCR Nashville TN	2390am	3210am	5070am	5935am		0800	0900		USA, WMLK Bethel PA	7555va	9475alt		
0700	0800	vl	Vanuatu, Radio	3945do	4960do	7260do			0800	0900	vl	USA, WRMI Miami FL	7385am			
0700	0800		Zambia, Christian Voice	9865do					0800	0900		USA, WSHB Cypress Crk SC	7535eu	9845pa		
0700	0800	vl	Zambia, National BC Corp	6165do	6265do				0800	0900	vl	USA, WTJC Newport NC	9370na			
0700	0800	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do				0800	0900	vl	USA, WWCR Nashville TN	2390am	3210am	5070am	5935am
0705	0800		New Zealand, R New Zealand Int	15175pa					0815	0900	f	Vanuatu, Radio	3945do	4960do	7260do	
0710	0715	mtwhf	Vatican City, Vatican Radio	4005eu	5883eu	6185eu	9645eu		0830	0900	f	Zambia, Christian Voice	9865do			
			11740eu	15595eu					0830	0900	vl	Zambia, National BC Corp	6165do	6265do		
0720	0735	smthwhf	Swaziland, Trans World Radio	6035af	7200af	9500af			0830	0900	vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do		
0730	0740	as	Guam, Trans World Radio	15330as					0855	0900	s	Seychelles, FEBA Radio	15460as			
0730	0758		Finland, YLE/R Finland	9510va	21670va							Australia, ABC/Alice Springs	2310do			
0730	0800		Austria, R Austria International	6155eu	13730eu				0830	0900	vl	Australia, ABC/Katherine	2485do			
0730	0800	vl	Papua New Guinea, NBC	4890do	9675do	17665af			0830	0900	vl	Australia, ABC/Tennant Creek	2325do			
0730	0800		Switzerland, Swiss R International	9885af	13635af				0830	0900	vl	Switzerland, Swiss R International	9885as	21770af		
0740	0800		Guam, Trans World Radio	15200as					0855	0900		Taiwan, CBS	11725as			
0745	0755	as	Monaco, Trans World Radio	9870eu												
0745	0800	as	Germany, Trans World Radio	12070eu									</			

**0900
UTC**

**4:00 AM EST
3:00 AM CST
1:00 AM PST**

Shortwave Guide



**5:00 AM EST
4:00 AM CST
2:00 AM PST**

**1000
UTC**

FREQUENCIES

0900	0915	vi	Ghana, Ghana BC Corp	3366do	4915do				1000	1027	Vietnam, Voice of	9839as	12019as
0900	0915		Guam, Trans World Radio	15200as	15330as				1000	1029	Czech Rep, Radio Prague Intl	21745va	
0900	0920		Monaco, Trans World Radio	9870eu					1000	1030	Guam, Adventist World Radio	15330as	
0900	0930		UK, BBC World Service	6195as	9605as	9740as	11760me		1000	1030	Singapore, RTE Radio	11740au	
				11765as	11945as	11955pa	12095eu	15190as	1000	1030	Sri Lanka, Sri Lanka BC Corp	4940do	
				15310as	15360as	15400af	15485eu	15565eu	1000	1045	Austria, R Austria International	6155eu	13730eu
				15575as	17640eu	17760as	17790as	17830af	1000	1056	China China Radio International	11675pa	15210pa
				17885af	21470af	21660as			1000	1100	Anguilla, Caribbean Beacon	11775am	
0900	0945		Germany, Deutsche Welle	6140eu	6160pa	11785af	12055as		1000	1100	Australia, ABC/Alice Springs	2310do	
				15410af	17770va	17820pa	17845va		1000	1100	Australia, ABC/Katherine	2485do	
				17860af	21560af				1000	1100	Australia, ABC/Tennant Creek	2325do	
0900	0956		China China Radio International	11675pa	11730pa	15210pa			1000	1100	Australia, Radio	9580va	13605va
0900	1000		Anguilla, Caribbean Beacon	6090am					1000	1100	Bhutan, Bhutan BC Service	6035do	17750as
0900	1000	vi	Australia, ABC/Alice Springs	2310do					1000	1100	Botswana, Radio	7255do	21820va
0900	1000	vi	Australia, ABC/Katherine	2485do					1000	1100	Cameroon, RTV/Yaounde	4850do	
0900	1000	vi	Australia, ABC/Tennant Creek	2325do					1000	1100	Canada, CFRX Toronto ON	6070do	
0900	1000	as	Australia, Radio	9580va	13605va	21820va			1000	1100	Canada, CFVP Calgary AB	6030do	
0900	1000	vi	Botswana, Radio	7255do	9600do	7255do			1000	1100	Canada, CHNX Halifax, NS	6130do	
0900	1000	vi	Cameroon, RTV/Yaounde	4850do					1000	1100	Canada, CKZN St John's NF	6160do	
0900	1000		Canada, CFRX Toronto ON	6070do					1000	1100	Canada, CKZU Vancouver BC	6160do	
0900	1000		Canada, CFVP Calgary AB	6030do					1000	1100	Costa Rica, R for Peace Intl	5920af	6970va
0900	1000		Canada, CHNX Halifax, NS	6130do					1000	1100	Costa Rica, University Network	5920af	15048irr
0900	1000		Canada, CKZN St John's NF	6160do					1000	1100	Ecuador, HCJB	11755pa	15048irr
0900	1000		Canada, CKZU Vancouver BC	6160do					1000	1100	Eat Guinea, Radio Africa	15185af	
0900	1000		Costa Rica, R for Peace Intl	5920af	6970va	15048irr			1000	1100	Eat. Guinea, Radio East Africa	15185af	
0900	1000		Costa Rica, University Network	5920af	6970va	15048irr			1000	1100	Finland, Scandv Weekend Radio	11690va	11720va
0900	1000		Ecuador, HCJB	11775pa	21455usb				1000	1100	Germany, Deutsche Welle	6140eu	
0900	1000	mtwhf	Eat Guinea, Radio Africa	15185af					1000	1100	Germany, Voice of Hope	21590me	
0900	1000	as/vl	Eat. Guinea, Radio East Africa	15185af					1000	1100	Ghana, Ghana BC Corp	4915do	
0900	1000	a/monthly	Finland, Scandv Weekend Radio	11690va	11720va				1000	1100	Ghana, Ghana BC Corp	4915do	
0900	1000		Germany, Deutsche Welle	6140eu					1000	1100	Guam, Adventist World Radio	11660as	
0900	1000	a	Germany, Good News World R	5985eu	5995eu				1000	1100	Guyana, Voice of	5949do	
0900	1000		Germany, Trans World Radio	12070eu					1000	1100	India, All India Radio	11585as	13700au
0900	1000		Germany, Voice of Hope	21590me					1000	1100		15020as	17485au
0900	1000		Guyana, Voice of	3289do	5949do				1000	1100	Italy, IRRS	7120va	
0900	1000	vl/as	Italy, IRRS	7120va					1000	1100	Japan, Radio	9695as	15590as
0900	1000		Kenya, Kenya BC Corp	4935do					1000	1100	Kenya, Kenya BC Corp	4935do	21755pa
0900	1000	vi	Lesotho, Radio	4800do					1000	1100	Lesotho, Radio	4800do	
0900	1000	vi	Liberia, ELWA	4760do					1000	1100	Liberia, ELWA	4760do	
0900	1000	vi	Liberia, R Liberia International	6100do					1000	1100	Liberia, R Liberia International	6100do	
0900	1000		Liberia, Voice of Hope	6280af					1000	1100	Liberia, Voice of Hope	11530af	
0900	1000		Malaysia, Radio	7295do					1000	1100	Malaysia, Radio	7295do	
0900	1000	s	Malta, Voice of Mediterranean	11770eu					1000	1100	N Marianas, KHBI Saipan	11870as	
0900	1000		Namibia, Namibian BC Corp	7165af	7215af				1000	1100	Namibia, Namibian BC Corp	7165af	7215af
0900	1000		New Zealand, R New Zealand Int	15175as					1000	1100	Netherlands, Radio	7260va	12065va
0900	1000		New Zealand, ZLXA	3935do	7290do				1000	1100	New Zealand, R New Zealand Int	15175as	
0900	1000	vi	Nigeria, Radio/Enugu	6025do					1000	1100	New Zealand, ZLXA	3935do	
0900	1000	vi	Nigeria, Radio/Ibadan	6050do					1000	1100	Nigeria, Radio/Enugu	6025do	
0900	1000	vi	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do		1000	1100	Nigeria, Radio/Ibadan	6050do	
0900	1000	vi	Nigeria, Radio/Lagos	3326do	4990do				1000	1100	Nigeria, Radio/Kaduna	4770do	6090do
0900	1000		Palau, KHBN/Voice of Hope	9955as	9965as	9985as	15725as		1000	1100	Nigeria, Radio/Lagos	4990do	7275do
0900	1000	vi	Papua New Guinea, NBC	4890do	9675do				1000	1100	Nigeria, Voice of	7255af	15120af
0900	1000		Russia, Voice of Russia WS	9905au	15460au	15470au	17495au		1000	1100	Palau, KHBN/Voice of Hope	9955as	9965as
				17525au	17570au				1000	1100	Papua New Guinea, NBC	4890do	9675do
0900	1000		Sierra Leone, Sierra Leone BS	3316do					1000	1100	Sierra Leone, Sierra Leone BS	5980do	
0900	1000		Singapore R Corp of Singapore	6150do					1000	1100	Singapore R Corp of Singapore	6150do	
0900	1000	vi	Solomon Islands, SIBC	5020do					1000	1100	Solomon Islands, SIBC	5020do	
0900	1000		Sri Lanka, Sri Lanka BC Corp	6130do	7110do	7196do			1000	1100	Uganda, Radio	5026do	7110do
0900	1000		Uganda, Radio	5026do					1000	1100	UK, BBC World Service	6195va	7196do
0900	1000	as	UK, BBC World Service	6190af	11940af				1000	1100	UK, BBC World Service	6195va	11760me
0900	1000		UK, Merlin Network One	6130eu					1000	1100	UK, BBC World Service	12095eu	11760me
0900	1000		USA, Armed Forces Radio	4278va	4319va	4993va	5765va		1000	1100	USA, Armed Forces Radio	15565eu	15485eu
				6350va	6458va	6847va	10320va	10940va	1000	1100	mtwhf	17790as	17640eu
				12579va	12689va	13362va	16847va		1000	1100	as	17885af	21660as
0900	1000		USA, KAUJ Dallas TX	5755va					1000	1100	a	15190sa	15400af
0900	1000		USA, KATN Salt Lake City UT	7510na					1000	1100		6190af	17830af
0900	1000		USA, KWHR Naalehu HI	11565pa	17780as				1000	1100		4278va	11940af
0900	1000		USA, Voice of America	11995as	13615as	15150as			1000	1100		6350va	4993va
0900	1000		USA, WEWN Birmingham AL	5825va	7425na				1000	1100		10940va	5765va
0900	1000		USA, WHRA Greenbush ME	7435af					1000	1100		16847va	10320va
0900	1000		USA, WHRI Noblesville IN	7315sa					1000	1100		12579va	13362va
0900	1000		USA, WJCR Upton KY	7490va	13595as				1000	1100		5755va	
0900	1000		USA, WMLK Bethel PA	7555va	9475alt				1000	1100		7510na	
0900	1000		USA, WRMI Miami FL	7385am					1000	1100		9930as	11565pa
0900	1000		USA, WSHB Cypress Crk SC	7535eu	9455sa				1000	1100		5985pa	6165ca
0900	1000		USA, WTJC Newport NC	9370na					1000	1100		11720as	7370ca
0900	1000		USA, WWCN Nashville TN	2390am	3210am	5070am	5935am		1000	1100		5825na	15250as
0900	1000	vi	Vanuatu, Radio	3945do	4960do	7260do			1000	1100		7425na	15425as
0900	1000		Zambia, Christian Voice	9865do					1000	1100		6040na	7465na
0900	1000	vi	Zambia, National BC Corp	6165do	6265do				1000	1100		9495sa	
0900	1000	vi	Zimbabwe, Zimbabwe BC Corp	5975do	6045do				1000	1100		7490va	13595as
0910	0930	s	Armenia, Voice of	4810eu	15270eu				1000	1100		9955am	
0915	0930		Guam, Trans World Radio	15330as					1000	1100		6095am	9455sa
0915	1000	vi	Ghana, Ghana BC Corp	6130do	4915do				1000	1100		9370na	
0915	1000	vl/as	Ghana, Ghana BC Corp	4915do	4915do				1000	1100		2390am	5070am
0920	0950	s	Monaco, Trans World Radio	9870eu					1000	1100		5950na	5935am
0930	1000	mtwhf	Guam, Trans World Radio	15330as					1000	1100		5950na	7435am
0930	1000		Italy, Adventist World Radio	9660eu					1000	1100		3945do	4960do
0930	1000		Netherlands, Radio	7260va	9790va	12065va			1000	1100		9865do	7260do
0930	1000		UK, BBC World Service	6195as	9740as	11760me	11955pa		1000	1100		6165do	6265do
				12095eu	15190as	15310as	15400af		1000	1100		5975do	6045do
				15485eu	15565eu	15575as	17640eu	17760as	1030	1045	mtwhf	5990do	7110do
				17790as	17830af	17885af	21470af	21660as	1030	1100		7160do	
									1030	1100		12085au	
									1030	1100		4940do	11835as
									1030	1100		13675eu	15120as
									1030	1100			15395eu
									1030	1100			21605eu

FREQUENCIES

1100 1105	Pakistan, Radio	17525eu	21460eu		1100 1200 vl	Papua New Guinea, NBC	4890do	9675do
1100 1125	Netherlands, Radio	7260va	9790va	12065va	1100 1200	Sierra Leone, Sierra Leone BS	5980do	
1100 1127	Vietnam, Voice of	7285as			1100 1200	Singapore, R Singapore Intl	6150as	9600as
1100 1130	Sri Lanka, Sri Lanka BC Corp	4940do	11835as	15210as 17850as	1100 1200	Switzerland, Swiss R International	9540as	21770as
1100 1130	Switzerland, Swiss R International	9535eu			1100 1200	Taiwan, Voice of Asia	7445as	
1100 1130 mtwhf	UK, BBC Caribbean Report	6195ca	15220ca		1100 1200	Uganda, Radio	5026do	7110do 7196do
1100 1130 as	UK, BBC World Service	6195na	15190sa	15220am	1100 1200 smtwhf	UK, BBC World Service	17885af	
1100 1200	Anguilla, Caribbean Beacon	11775am			1100 1200 s	UK, BBC World Service	6190af	11940af
1100 1200 vl	Australia, ABC/Alice Springs	2310do			1100 1200 as	UK, BBC World Service	5965na	6195va 9580as 9740as
1100 1200 vl	Australia, ABC/Katherine	2485do					11760me	11955as 12095eu 15220am 15280as
1100 1200 vl	Australia, ABC/Tennant Creek	2325do					15310as	15400af 15485eu 15565eu 15575as
1100 1200	Australia, Radio	5995pa	6020va	9580va 12080pa			17640eu	17700as 17830af 21470af
		21820va			1100 1200 a	UK, Flat Earth Radio/Merlin	21455me	21515af
1100 1200 vl	Botswana, Radio	7255do	9600do	7255do	1100 1200 a	UK, Virgin Radio/Merlin	21455me	21515af
1100 1200 vl	Cameroon, RTV/Yaounde	4850do			1100 1200	USA, Armed Forces Radio	4278va	4319va 4993va 5765va
1100 1200	Canada, CFRX Toronto ON	6070do					6350va	6458va 6847va 10320va 10940va
1100 1200	Canada, CFVX Calgary AB	6030do					12689va	12689va 13362va 16847va
1100 1200	Canada, CHNX Halifax, NS	6130do			1100 1200	USA, Armed Forces Radio	4278va	4319va 4993va 5765va
1100 1200	Canada, CKZN St John's NF	6160do					6350va	6458va 6847va 10320va 10940va
1100 1200	Canada, CKZU Vancouver BC	6160do					12689va	12689va 13362va 16847va
1100 1200	Costa Rica, R for Peace Intl	15048irr	21815usb		1100 1200	USA, KAIJ Dallas TX	5755va	
1100 1200	Costa Rica, University Network	15048irr	21815usb		1100 1200	USA, KTBN Salt Lake City UT	7510na	
					1100 1200	USA, KWHR Naalehu HI	9930as	11565pa
1100 1200	Ecuador, HCJB	12005am	15115va	21455usb	1100 1200	USA, Voice of America	5985pa	6110as 9645as 9760as
1100 1200 mtwhf	Eat Guinea, Radio Africa	15185af					11705as	11720as 15250as 15425as
1100 1200 as/vl	Eat Guinea, Radio East Africa	15185af			1100 1200	USA, WEWN Birmingham AL	5825na	7425na 15745na
1100 1200 a/monthly	Finland, Scandv Weekend Radio	11690va	11720va		1100 1200	USA, WHRI Noblesville IN	6040na	9495sa
1100 1200	Germany, Deutsche Welle	6140eu	15410af	17800af 21780af	1100 1200	USA, WJCR Upton KY	7490va	13595as
1100 1200	Germany, Voice of Hope	21590me						
1100 1200 vl	Ghana, Ghana BC Corp	6130do	4915do		1100 1200	USA, WRMI Miami FL	9955am	
1100 1200 vl/as	Ghana, Ghana BC Corp	4915do	4915do		1100 1200	USA, WSHB Cypress Crk SC	6095am	11660va
1100 1200	Guyana, Voice of	5949do			1100 1200	USA, WTJC Newport NC	9370na	
1100 1200	Iran, VOIRI	15185as	15385as	15585as 21470as	1100 1200	USA, WWCR Nashville TN	2390am	5070am 5935am 9475am
		21730as			1100 1200	USA, WYFR Okeechobee FL	5950na	11830na
1100 1200 vl/as	Italy, IRRS	7120va			1100 1200 vl/s	Vanuatu, Radio	3945do	4960do 7260do
1100 1200	Japan, Radio	6120na	9695as	15590as	1100 1200	Zambia, Christian Voice	9865do	
1100 1200	Jordan, Radio	11690eu			1100 1200 vl	Zambia, National BC Corp	6165do	6265do
1100 1200	Kenya, Kenya BC Corp	4935do			1100 1200 vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do
1100 1200 vl	Lesotho, Radio	4800do			1110 1120	Greece, Voice of	9420eu	15630eu
1100 1200 vl	Liberia, ELWA	4760do			1115 1130 mtwhf	Vatican City, Vatican Radio	5883eu	9645eu 11740eu
1100 1200 vl	Liberia, R Liberia International	6100do					15595eu2	1850eu
1100 1200	Liberia, Voice of Hope	11530af			1115 1145	Nepal, Radio	5005as	7165as
1100 1200	Malaysia, Radio	7295do			1130 1135	Israel, Kol Israel	15640va	17545va
1100 1200	Malaysia, TRM Sarawak	7160do			1130 1157	Czech Rep, Radio Prague Intl	11640eu	21745as
1100 1200	Namibia, Namibian BC Corp	7165af	7215af		1130 1200	Belgium, Radio Vlaanderen Intl	9865as	
1100 1200	New Zealand, R New Zealand Int	15175as			1130 1200	Netherlands, Radio	6045eu	9855eu
1100 1200	New Zealand, ZLXA	3935do			1130 1200	South Korea, R Korea Intl	9650na	
1100 1200 vl	Nigeria, Radio/Enugu	6025do			1130 1200	Sri Lanka, Sri Lanka BC Corp	4940do	
1100 1200 vl	Nigeria, Radio/Ibadan	6050do			1130 1200 a	UK, Wales Radio Intl/Merlin	17625au	
1100 1200 vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do 9570do	1130 1200 f	Vatican City, Vatican Radio	15595va	17515va
1100 1200 vl	Nigeria, Radio/Lagos	4990do	7285do		1145 1200 vl	Libya, Voice of Africa	11815af	17725af
1100 1200	Palau, KHBN/Voice of Hope	9955as	9965as	9985as 13840as				

SELECTED PROGRAMS

Newscasts (*extended)

1100	BBCWS(am)	D	World Briefing*
	R. Australia	D	News
	R. Japan	D	News
	R. New Zealand Int.	D	News
1105	R. New Zealand Int.	M-F	Late Edition*
1120	BBCWS(am)	D	British News
1130	R. Korea Int.	D	News

Current Affairs Magazines/Features

1105	BBCWS(am)	M-F	Caribbean Report**
	R. Australia	M-F	Asia Pacific
1110	R. Japan	A	Roundup Asia
1115	R. Japan	M-F	Asian Top News (region's radio)
1140	R. Korea Int.	M-F	News Commentary

Business/Economics

1128	HCJB	M-F	Money Minute
1130	BBCWS(am)	M-F	World Business Report
		A	World Business Review
1145	R. Korea Int.	W	Economic Radar

Arts and Culture

1130	BBCWS(am)	S	Arts in Action
1145	R. Korea Int.	T	Cultural Promenade

Local Lives and Views

1105	R. New Zealand Int.	S	Sunday Supplement
1115	BBCWS(am)	M-F	Caribbean Magazine**
1130	R. Australia	S	In Conversation-Rural
1135	R. Australia	M-F	Life Matters (social issues)
1145	R. Korea Int.	H	Korea and Its Splendors

Informational Features

1115	R. Australia	A	Lingua Franca (about language)
1125	R. New Zealand Int.	S	A Question of Religion
	R. Japan	T	Let's Try Japanese
		H	Brush Up Your Japanese

1145	R. Korea Int.	M	Exploring the New Millennium
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Music

1100	HCJB	S	Morning Song (hymns)
	WWCR(9475 kHz)	M	Worldwide Country Radio
1105	R. Australia	S	Jazz Notes
	R. New Zealand Int.	A	Deep Purple
1125	R. Japan	M	Journey Around Japan
		W	Unforgettable Masterpieces
		F	Music Beat (pop)
1130	WWCR(5070 kHz)	S	Musical Memories
1145	R. Korea Int.	F	Notes of Nostalgia

Entertainment/Variety, Magazine Shows

1105	R. Australia	A	Book Reading
1130	HCJB	M-F	Morning in the Mountains

SWL, Media and Communications

1140	R. Korea Int.	S	Multivave Feedback
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Listener Contact/Interactive

1110	R. Japan	S	Hello From Tokyo
1140	R. Korea Int.	A	From Us to You

Sport

1110	BBCWS(am)	M-F	Caribbean Sport**
1130	R. Australia	M-F	Sports Report
1145	BBCWS(am)	M-A	Sports Roundup

** (special to Caribbean on 6195, 15220 kHz only)

0300	HCJB	S	Alive! (Christian lifestyles)
	WWCR(3215 kHz)	M	Pat Boone
		A	Golden Age of Radio
0310	R. Australia	M-F	Margaret Throsby Interview
0330	HCJB	M	Radio Reading Room (Christian lit.)
		T	Unshackled (radio's oldest drama series)
	R. Australia	A	Book Reading
0332	Voice of Russia	A	Audio Book Club
0340	Voice of Vietnam	M	Sunday Show

SWL, Media and Communications

0300	WWCR(5070 kHz)	S	Communications World
0305	R. New Zealand Int.	H	Pacific DXers Report (biweekly)
		RN2I	Talk (meet the staff-biweekly)
0330	WWCR(5070 kHz)	S	World of Radio
0340	R. Budapest	S	DX Blackbuster
	R. Habana Cuba	S/W	DXers Unlimited
0345	R. Sweden	W	Mediascan (1st/3rd wk.)

Listener Contact/Interactive

0305	R. New Zealand Int.	H	Mailbox (biweekly)
0311	Voice of Russia	S/W/H	Moscow Mailbag
0320	China R. Int.	A	Listeners' Garden
0330	R. Australia	S	Feedback
	R. Sweden	M	In Touch with Stockholm (1st wk.)
0340	R. Budapest	M	And the Gatepost
	R. Habana Cuba	H	Mailbag Show
0345	Voice of Vietnam	H	Letterbox
0346	Voice of Russia	S	You Write to Moscow

Sport

0300	Channel Africa	A	Channel Africa Sport
	R. Australia	S/A	Grandstand (live action-special on 9660, 12080, 17580, 17715, 17750, 21725 kHz only)
	R. New Zealand Int.	S/A	Live Sport (in season)
0320	BBCWS(am)	D	Sports Roundup
0330	China R. Int.	T	Sports World
	Deutsche Welle	F	Spotlight on Sport
	R. New Zealand Int.	H	The World in Sport
0335	R. Habana Cuba	T-A	Time Out
0345	R. Sweden	T	Sportscan

Continued from 0300

Entertainment/Variety, Magazine Shows



FREQUENCIES

1200 1205	New Zealand, R New Zealand Int	15175as			
1200 1215	Somalia, Radio Galkayo	6985va			
1200 1220 fa	Kazakhstan, Radio Almaty	11840eu			
1200 1222 as	UK, BBC World Service	6190af	6195na	11940af	15220am
1200 1227	Iran, VOIRI	15185as	15385as	15585as	21470as
	21730as				
1200 1230	Philippines, FEBC	15110as			
1200 1230	Sri Lanka, Sri Lanka BC Corp	4940do			
1200 1230	Uzbekistan, Radio Tashkent	5060as	5975as	6025as	9715as
1200 1245	USA, WYFR Okeechobee FL	5950na	11830na	11970na	
1200 1256	China China Radio International	9705as	9730as	9760pa	11675pa
	11980as	15415as			
	11335va	3560va	9640va	9850va	9975va
	11335va	13650va			
1200 1259	Canada, R Canada International	6150as	11730as		
1200 1300	Anguilla, Caribbean Beacon	11775am			
1200 1300 vl	Australia, ABC/Alice Springs	2310do			
1200 1300 vl	Australia, ABC/Katherine	2485do			
1200 1300 vl	Australia, ABC/Tennant Creek	2325do			
1200 1300	Australia, Radio	5995pa	6020va	9580va	11650pa
	21820va				
1200 1300 vl	Botswana, Radio	7255do	9600do	7255do	
1200 1300	Brazil, Radio Nacional Bras	15445am			
1200 1300	Bulgaria, Radio	15700eu	17500eu		
1200 1300 vl	Cameroun, RTV/Yaounde	4850do			
1200 1300	Canada, CBC Northern Service	9625do			
1200 1300	Canada, CFRX Toronto ON	6070do			
1200 1300	Canada, CFVP Calgary AB	6030do			
1200 1300	Canada, CHNX Halifax, NS	6130do			
1200 1300	Canada, CKZN St John's NF	6160do			
1200 1300	Canada, CKZU Vancouver BC	6160do			
1200 1300	Costa Rica, R for Peace Intl	15048irr	21815usb		
1200 1300	Costa Rica, University Network	15048irr	21815usb		
1200 1300	Ecuador, HCJB	12005am	15115va	21455usb	
1200 1300 as/vl	Eat. Guinea, Radio East Africa	15185af			
1200 1300 a/monthly	Finland, Scandv Weekend Radio	11690va	11720va		
1200 1300	France, R France International	11670af	15155af	15195af	15540af
1200 1300	Germany, Deutsche Welle	6140eu			
1200 1300	Germany, Voice of Hope	15715me			
1200 1300 vl	Ghana, Ghana BC Corp	4915do	6130do		
1200 1300	Guyana, Voice of	5949do			
1200 1300 vl/as	Italy, IRRS	7120va			
1200 1300	Jordan, Radio	11690eu			
1200 1300	Kenya, Kenya BC Corp	4935do			
1200 1300 vl	Lesotho, Radio	4800do			
1200 1300 vl	Liberia, ELWA	4760do			
1200 1300 vl	Liberia, R Liberia International	6100do			
1200 1300	Liberia, Voice of Hope	11530af			
1200 1300	Malaysia, Radio	7295do			
1200 1300	N Marianas, KHBI Saipan	5915as	9880as		
1200 1300	Namibia, Namibian BC Corp	7165af	7215af		
1200 1300	Netherlands, Radio	6045eu	9855eu		
1200 1300	New Zealand, ZLXA	3935do			
1200 1300 vl	Nigeria, Radio/Enugu	6025do			
1200 1300 vl	Nigeria, Radio/Ibadan	6050do			
1200 1300 vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
1200 1300 vl	Nigeria, Radio/Lagos	4990do	7285do		
1200 1300	Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as
1200 1300 vl	Papua New Guinea, NBC	4890do	9675do		
1200 1300	Sierra Leone, Sierra Leone BS	5980do			
1200 1300	Singapore, R Singapore Intl	6150as	9600as		
1200 1300	Taiwan, R Taiwan International	7130as	9610au		
1200 1300	Uganda, Radio	5026do	7110do	7196do	
1200 1300	UK, BBC World Service	5965na	6195va	9515na	9580as
	9740as	11760me	11955as	12095eu	15220am
	15280as	15310as	15485eu	15565eu	15575me
	17640eu	17700as	17830af	17885af	21470af
1200 1300 a	UK, Flat Earth Radio/Merlin	9430na	21515af		
1200 1300 a	UK, Virgin Radio/Merlin	21455me	21515af		
1200 1300	Ukraine, R Ukraine International	15520eu			
1200 1300	USA, Armed Forces Radio	4278va	4319va	4993va	5765va
	6350a	6458va	6847va	10320va	10940va
	12579va	12689va	13362va	16847va	
1200 1300	USA, KAU Dallas TX	5755va			
1200 1300	USA, KTBN Salt Lake City UT	7510na			
1200 1300	USA, KWHR Naalehu HI	9930as	11565pa		
1200 1300	USA, Voice of America	6110as	9645as	9760as	11705as
	11715as	15250as	15425as		
1200 1300	USA, WEWN Birmingham AL	5825na	7425na	15745na	
1200 1300	USA, WHRI Noblesville IN	6040na	9495as		
1200 1300	USA, WJCR Upton KY	7490va	13595as		
1200 1300	USA, WRMI Miami FL	9955am			
1200 1300	USA, WSHB Cypress Crk SC	6095am	11660va		
1200 1300	USA, WTJC Newport NC	9370na			
1200 1300	USA, WWCN Nashville TN	5070am	5935am	7435am	15685am
1200 1300 vl/s	Vanuatu, Radio	3945do	4960do	7260do	
1200 1300	Zambia, Christian Voice	9865do			
1200 1300 vl	Zambia, National BC Corp	6165do	6265do		
1200 1300 vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do		
1204 1220 mtwhf	UK, BBC Caribbean Report	6195ca	15220ca		
1205 1300 occsnl	New Zealand, R New Zealand Int	6095pa			
1215 1300	Egypt, Radio Cairo	17595as			
1220 1240 w	Kazakhstan, Radio Almaty	9620eu	11840eu		
1220 1300 as	UK, BBC World Service	6190af	11940af		
1230 1256	Belgium, Radio Vlaanderen Intl	9925eu			
1230 1257	Vietnam, Voice of	12019as			
1230 1300 mtwhfa	Austria, R Austria International	6155eu	13730eu		
1230 1300	Bangladesh, Bangla Betar	7184as	9558as		
1230 1300	Italy, Adventist World Radio	17820eu			
1230 1300	Sri Lanka, Sri Lanka BC Corp	4940do	6005as	6075as	9770as
	15425as				
1230 1300	Sweden, Radio	18960na			
1230 1300	Thailand, Radio	9810as			
1240 1300 t	Kazakhstan, Radio Almaty	9620eu	11840eu		
1245 1300 a	Seychelles, FEBA Radio	15535me			
1255 1300 mtwhfa	Taiwan, CBS	6180as	7250as	9630as	11725as
	11775as				

SELECTED PROGRAMS

Newscasts (*extended)

1200	BBCWS(am)	D	NewsHour*
	HCJB	M-F	Latin American & World News
	R. Australia	D	News
1210	BBCWS(am)	M-F	Caribbean Report*
1230	HCJB	M-F	Latin American & World News

Current Events Magazines/Features

1230	R. Sweden	M-F	60 Degrees North
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Business/Economics

1205	BBCWS(am)	M-F	Caribbean Business (special to Caribbean on 6195, 15220 kHz only)
1245	R. Sweden	W	Money Matters

Science/Technology

1215	WWCR(15685kHz)	A	Eco Watch
1245	R. Sweden	H	Greenscan (ecology-2nd wk.) Heartbeat (3rd wk.)

Arts and Culture

1230	R. Sweden	A	Spectrum (3rd wk.)
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Local Lives and Views

1205	R. Australia	M-H	Late Night Live (discussion)
1230	R. Sweden	A	Weekend (Europe magazine-1st wk.) Sweden Today (2nd) Studio 49 discussion-3rd)
1245	R. Sweden	H	Nordic Report (1st) The S-Files (things Swedish-4th)
		F	Review of the Newsweek

Informational Features

1205	R. Australia	A	The Spirit of Things (spiritual matters)
	WWCR(5070 kHz)	A	This Week in Americana (collectibles)
1224	HCJB	M-F	Mission Network News

1230	HCJB	A	Adventures in Odyssey (stories)
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Music

1200	WWCR(15685kHz)	F	The Big Backyard (Australian country)
1205	R. Australia	S	Country Club
		F	Sound Quality (innovative)
1230	R. Sweden	S	Sounds Nordic (rock-exc. 1st wk.)

Entertainment/Variety, Magazine Shows

1200	HCJB	M-F	Morning in the Mountains (from 1130)
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SWL, Media and Communications

1200	WWCR(15685kHz)	T	World of Radio
		W	Communications World
1230	R. Sweden	T	Mediascan (1st/3rd wk.)
	WHRI(9495 kHz)	A	Dxing with Cumbre
	WWCR(15685kHz)	A	World of Radio

Listener Contact/Interactive

1215	WWCR(15685 kHz)	S/M	Ask WWCR
1230	R. Sweden	S	In Touch with Stockholm (1st wk.)

Sport

1205	HCJB	M-F	Sports News
1245	R. Sweden	M	Sportscan

0232	Voice of Russia	T	Folk Box
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Continued from 0200

		W	Jazz Show
		H	Russian Musical Highlights (history)
		F	Yours for the Asking
0240	Swiss R. Int.	S	Sounds Good (Swiss music-3rd/5th wk.)

0246	Voice of Russia	F	Music At Your Request
0250	Voice of Vietnam	S	Music (Vietnamese)

Entertainment/Variety, Magazine Shows

0200	HCJB	M	Sunday Nite
		H	Adventures in Odyssey (children's stories)
		S	Marion's Attic (vintage recordings)
0205	R. New Zealand Int.	S	Playhouse (radio theatre)
0232	Voice of Russia	M	Timelines
0240	Voice of Vietnam	M	Sunday Show

SWL, Media and Communications

0200	HCJB	S	Ham Radio Today
0205	R. Canada Int.	M	CIDX Report (biweekly)
0210	R. Budapest	S	DX Blockbuster
0230	R. Korea Int.	M	Multiwave Feedback
0245	R. Sweden	W	Media Scan (1st/3rd wk.)

Listener Contact/Interactive

0205	R. Canada Int.	M	Maple Leaf Mailbag
0210	R. Budapest	M	And the Gatepost (monthly)
0215	R. Prague	A	Mailbox
0230	R. Korea Int.	S	From Us to You
	R. Sweden	M	In Touch with Stockholm (1st wk.)
0240	Swiss R. Int.	S	Capital Letters (2nd/4th wk.)
0245	R. Taipei Int.	S	Mailbag Time
	Voice of Vietnam	H	Letterbox
	WWCR(5070 kHz)	S	Ask WWCR

Sport

0200	R. New Zealand Int.	S/A	Live Sport (in season)
0205	BBCWS(am)	H	Sports International (magazine)
	R. Australia	S/A	Grandstand (live sports action - special on 9660, 12080, 17580, 17715, 17750, 21725 kHz only)
0245	R. Sweden	T	Sportscan



FREQUENCIES

1400	1405		Vatican City, Vatican Radio	15235au	17515au		1400	1500	vl	Nigeria, Radio/Enugu	6025do				
1400	1429		Czech Rep, Radio Prague Intl	21745va			1400	1500	vl	Nigeria, Radio/Ibadan	6050do				
1400	1430		Thailand, Radio	9530as			1400	1500	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	
1400	1430		Turkey, Voice of	17690as	17815eu		1400	1500	vl	Nigeria, Radio/Lagos	4990do	7285do			
1400	1430	s	USA, Voice of America	18275va			1400	1500		Oman, Radio Sultanate of	15140va				
1400	1455	as	S Africa, Channel Africa	11720af	17780af	21725af									
1400	1456		China, China Radio International	7180as	7405na	9700as	11675as								
			11765as	13685af	15125af			1400	1500		Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as
1400	1500		Anguilla, Caribbean Beacon	11775am				1400	1500		Sierra Leone, Sierra Leone BS	5980do			
1400	1500	vl	Australia, ABC/Alice Springs	2310do				1400	1500		Singapore R Corp of Singapore	6150do			
1400	1500	vl	Australia, ABC/Katherine	2485do				1400	1500		Sri Lanka, Sri Lanka BC Corp	4940do	6005as	6075as	9770as
1400	1500	vl	Australia, ABC/Tennant Creek	2325do						15425as					
1400	1500		Australia, Radio	5995as	6080pa	9580as	11650pa	1400	1500		Switzerland, Swiss R International	12010as	15185as		
			11660va					1400	1500		Taiwan, R Taiwan International	15125as			
1400	1500	vl	Botswana, Radio	7255do	9600do	7255do		1400	1500		Uganda, Radio	4976do	5026do		
1400	1500	vl	Cameroon, RTV/Yaounde	4850do				1400	1500		UK, BBC World Service	5995as	6190af	6195as	9590na
1400	1500		Canada, CBC Northern Service	9625do						9740as	11940af	12095eu	15220na	15310as	
1400	1500		Canada, CFRX Toronto ON	6070do						15485eu	15565eu	15575me	17640eu	17700as	
1400	1500		Canada, CFVP Calgary AB	6030do						17830af	17840am	21470af	21660af		
1400	1500		Canada, CHNX Halifax, NS	6130do				1400	1500	a	UK, Flat Earth Radio/Merlin	15665na	21455me	21515af	
1400	1500		Canada, CKZN St John's NF	6160do				1400	1500	a	UK, Virgin Radio/Merlin	21455me	21515af		
1400	1500		Canada, CKZU Vancouver BC	6160do				1400	1500		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
1400	1500		Canada, R Canada International	9640na	13655na	17710na				6350va	6458va	6847va	10320va	10940va	
1400	1500		Costa Rica, R for Peace Intl	15048irr	21815usb					12579va	12689va	13362va	16847va		
1400	1500		Costa Rica, University Network	15048irr	21815usb			1400	1500		USA, KAIJ Dallas TX	13815va			
1400	1500		Ecuador, HCJB	12005am	15115va	21455usb		1400	1500		USA, KJES Vado NM	11715na			
1400	1500	as/vl	Egt. Guinea, Radio East Africa	15185af				1400	1500		USA, KTBN Salt Lake City UT	7510na			
1400	1500	a/monthly	Finland, Scandv Weekend Radio	11690va	11720va			1400	1500		USA, KWHR Naelehu HI	9930as	11565as		
1400	1500		France, R France International	11610as	17620as	17680af		1400	1500		USA, Voice of America	6110as	7125as	9645as	9760as
1400	1500		Germany, Deutsche Welle	6140eu						11705as	15205as	15395as	15425as		
1400	1500		Germany, Overcomer Ministries	6110eu				1400	1500		USA, WEWN Birmingham AL	11875va	15375na	15745na	
1400	1500		Germany, Voice of Hope	15715me	17550as			1400	1500		USA, WHRI Noblesville IN	6040na	15105na		
1400	1500	vl	Ghana, Ghana BC Corp	4915do	6130do			1400	1500		USA, WJCR Upton KY	7490va	13595as		
1400	1500		Guyana, Voice of	5949do				1400	1500		USA, WRMI Miami FL	15725am			
1400	1500		India, All India Radio	9690as	11620as	13710as		1400	1500		USA, WTJC Newport NC	9370na			
1400	1500	vl/as	Italy, IRRS	7120va				1400	1500		USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1400	1500		Japan, Radio	7200as	9505as	9845as	11880va	1400	1500		USA, WWFV McCaysville GA	9400am	12172am		
1400	1500		Jordan, Radio	11690eu				1400	1500		USA, WYFR Okeechobee FL	11550as	11740na	11830na	17760na
1400	1500		Kenya, Kenya BC Corp	4935do				1400	1500	vl	Zambia, Christian Voice	9865do			
1400	1500	vl	Lesotho, Radio	4800do				1400	1500	vl	Zambia, National BC Corp	6165do	6265do		
1400	1500	vl	Liberia, ELWA	4760do				1415	1420		Zimbabwe, Zimbabwe BC Corp	5975do	6045do		
1400	1500	vl	Liberia, R Liberia International	6100do				1430	1500		Nepal, Radio	5005as	7165as		
1400	1500		Liberia, Voice of Hope	11530af				1430	1500		Austria, R Austria International	6155eu	13730eu	17855au	
1400	1500		Malaysia, Radio	7295do				1430	1500		Guam, Adventist World Radio	15225as			
1400	1500		Malaysia, RTM Sarawak	7160do				1430	1500		Guam, Trans World Radio	15330as			
1400	1500		Namibia, Namibian BC Corp	7165af	7215af			1430	1500		Malaysia, RTM Kota Kinabalu	5980do			
1400	1500	occsnal	New Zealand, R New Zealand Int	6095pa				1430	1500		Myanmar, Radio	5985do			
1400	1500		New Zealand, ZLXA	3935do				1430	1500		Netherlands, Radio	12070as	12090as	15595as	
								1430	1500		Sweden, Radio	17505va	18960na		

SELECTED PROGRAMS

Newscasts

1400	BBCWS(am)	D	News
	China R. Int.	D	News
	R. Australia	D	News
	R. Canada Int.	D	News
	R. Japan	D	News
	R. Prague	D	News

Current Affairs Magazines/Features

1405	R. Canada Int.	S	The Sunday Edition (from 1310)
		M-F	This Morning (from 1310)
1410	China R. Int.	S	Report on Developing Countries
		M-F	Current Affairs
		A	Global Review
	R. Japan	S	Roundup Asia
1415	R. Japan	M-F	44 Minutes
1430	R. Sweden	M-F	60 Degrees North

Business/Economics

1420	China R. Int.	W	China Horizons
	R. Prague	H	Economic Report
1445	R. Sweden	W	Money Matters

Science/Technology

1445	R. Sweden	H	Greenscan (ecology-2nd wk.) Heartbeat (health-3rd wk.)
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Arts and Culture

1405	BBCWS(am)	T	Meridian-Screen (film)
		H	Meridian-Writing (books)
	R. Australia	S	Books and Writing
	R. Prague	A	The Arts
1415	R. Prague	S	Readings from Czech Literature
1420	China R. Int.	S	In the Spotlight
1430	R. Sweden	S	Spectrum (3rd wk.)

Local Lives and Views

1405	R. Prague	S	Letter from Prague
		M-F	Current Affairs
1410	R. Japan	S	Weekend Square
	R. Prague	S	From the Weeklies
1415	R. Prague	M	Spotlight (Czech events) or One on One (interview)
		W	Czechs in History or Central Europe Today
1420	R. Prague	T	Talking Point
1430	China R. Int.	M	People in the Know
		F	Life in China
	R. Sweden	A	Weekend (Europe magazine-1st wk.) Sweden Today (2nd wk.) Studio 49 (discussion-4th wk.)
1445	R. Sweden	H	Nordic Report (1st wk.) The S-Files (things Swedish-4th wk.)
		F	Review of the NewswEEK

Informational Features

1405	BBCWS(am)	M	Meridian-Ideas
	R. Australia	A	New Dimensions ("progressive" ideas)
1420	China R. Int.	H	Voices from Other Lands

Music

1400	R. Sweden	S	Sounds Nordic (rock/pop-exc. 1st wk.)
1405	BBCWS(am)	W	Meridian-Music
		F	Meridian-Masterpiece
	R. Australia	M-F	The Planet (from 1315)
1410	R. Prague	A	Saturday Music (classical/folk/jazz)
1430	BBCWS(am)	M	Music Mix
		T	UK Top 20
		H	World of Music
1445	BBCWS(am)	W	UK Album Chart
		F	Music X-Press

Entertainment/Variety, Magazine Shows

1400	Channel Africa	S/A	Channel Africa Extra (from 1300)
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1405	R. Canada Int.	A	Basic Black (humor)
1430	BBCWS(am)	W/F	Westway (drama serial)
	HCIJ	A	Alive! (Christian lifestyles)

SWL, Media and Communications

1445	R. Sweden	T	Mediascan (1st/3rd wk.)
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Listener Contact/Interactive

1405	BBCWS(am)	S	Talking Point (current events call-in)
1415	R. Prague	F	Mailbox
	WWCR(15685kHz)	A	Ask WWCR
1420	China R. Int.	A	Listeners' Garden
1430	R. Sweden	S	In Touch with Stockholm (1st wk.)

Sport

1405	BBCWS(am)	A	Sportsworld (live action)
1430	China R. Int.	T	Sports World
1445	R. Sweden	M	Sportscan

FREQUENCIES

1500 1530	Ecuador, HCJB	21455	usb	1500 1600	vi	Nigeria, Radio/Lagos	4990do	7285do		
1500 1530	Germany, Voice of Hope	15715me	17550as	1500 1600	vi	Nigeria, Voice of	7255af	15120af		
1500 1530	Jordan, Radio	11690eu		1500 1600		Palau, KHBN/Voice of Hope	9955as	9965as	9985as	13840as
1500 1530	Mexico, R Mexico International	9705am	11770am	1500 1600		Russia, Voice of Russia WS	7180na	7315as	9800as	9875as
1500 1530	Mongolia, Voice of	12015as	12085as				11500as			
1500 1530	S Africa, Channel Africa	17770af		1500 1600		S Africa, World Beacon	6145af			
1500 1556	China China Radio International	7160as	7405na	9785as	13685af	Seychelles, FEBA Radio	11600as			
		15125af				Sierra Leone, Sierra Leone BS	5980do			
1500 1556	North Korea, R Pyongyang	4405va	6574na	9335na	11710na	Singapore R Corp of Singapore	6150do			
		13760na				Sri Lanka, Sri Lanka BC Corp	4940do	6005as	6075as	9770as
1500 1559	Canada, R Canada International	9640na	13655na	17710na			15425as			
1500 1600	Anguilla, Caribbean Beacon	11775am				Uganda, Radio	4976do	5026do		
1500 1600	Australia, ABC/Alice Springs	2310do				UK, BBC World Service	5975as	5995as	6190af	6195as
1500 1600	Australia, ABC/Katherine	2485do					9410eu	9515na	9590na	9740as
1500 1600	Australia, ABC/Tennant Creek	2325do					11940af	12095eu	15220na	15310as
							15420af	15485eu	15565eu	17700as
1500 1600							17840am	21470af	21490af	21660af
								15665na	21455me	21515af
1500 1600	Australia, Radio	5995va	6080pa	9580as	11650pa	UK, Flat Earth Radio/Merlin	15665na	21455me	21515af	
		11660va				UK, Virgin Radio/Merlin	21455me	21515af		
1500 1600	Botswana, Radio	7255do	9600do	7255do		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
1500 1600	Cameron, RTV/Yaounde	4850do					6350va	6458va	6847va	10320va
1500 1600	Canada, CBC Northern Service	9625do					12579va	13362va	16847va	10940va
1500 1600	Canada, CFRX Toronto ON	6070do								
1500 1600	Canada, CFVP Calgary AB	6030do								
1500 1600	Canada, CHNX Halifax, NS	6130do								
1500 1600	Canada, CKZN St John's NF	6160do								
1500 1600	Canada, CKZU Vancouver BC	6160do								
1500 1600	Costa Rica, R for Peace Intl	15048va	21815usb							
1500 1600	Costa Rica, University Network	15048va	21815usb							
1500 1600	Ecuador, HCJB	12005am	15115va							
1500 1600	Eq. Guinea, Radio East Africa	15185af								
1500 1600	Finland, Scandv Weekend Radio	11690va								
1500 1600	Germany, Deutsche Welle	6140eu								
1500 1600	Germany, Overcomer Ministries	6110eu	13810af							
1500 1600	Ghana, Ghana BC Corp	4915do	6130do							
1500 1600	Guam, Trans World Radio	15330as								
1500 1600	Guyana, Voice of	5949do								
1500 1600	Italy, IRRS	7120va								
1500 1600	Japan, Radio	7200as	9750as	9845as						
1500 1600	Kenya, Kenya BC Corp	4935do								
1500 1600	Lesotho, Radio	4800do								
1500 1600	Liberia, ELWA	4760do								
1500 1600	Liberia, R Liberia International	6100do								
1500 1600	Liberia, Voice of Hope	11530af								
1500 1600	Malaysia, Radio	7295do								
1500 1600	Malaysia, RTM Kota Kinabalu	5980do								
1500 1600	Malaysia, RTM Sarawak	7160do								
1500 1600	Myanmar, Radio	5985do								
1500 1600	Namibia, Namibian BC Corp	7165af	7215af	15595as						
1500 1600	Netherlands, Radio	12070as	12095as	15595as						
1500 1600	New Zealand, R New Zealand Int	6095pa								
1500 1600	New Zealand, ZLXA	3935do								
1500 1600	Nigeria, Radio/Enugu	6025do								
1500 1600	Nigeria, Radio/Ibadan	6050do								
1500 1600	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do					

SELECTED PROGRAMS

Newscasts

1500	BBCWS(am)	D	News
	China R. Int.	D	News
	R. Australia	D	News
	R. Canada Int.	D	News
	Voice of Russia	D	News
1530	Voice of Russia	D	News in Brief

Current Events Magazines/Features

1505	BBCWS(am)	S	From Our Own Correspondent
	R. Australia	M-F	Asia Pacific
	R. Canada Int.	S	The Sunday Edition (from 1310)
		M-F	This Morning (from 1310)
1510	China R. Int.	S	Report on Developing Countries
		M-F	Current Affairs
		A	Global Review
1511	Voice of Russia	S	Sunday Panorama
		M-A	News and Views

Business/Finance

1530	China R. Int.	W	China Horizons
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Science/Technology

1505	BBCWS(am)	M	One Planet (ecology)
		T	Discovery (research)
		W	Health Matters
		H	Science View
1530	R. Australia	M	The Health Report

Arts and Culture

1520	China R. Int.	S	In the Spotlight
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Local Lives and Views

1530	BBCWS(am)	S	People and Politics (Parliament)
	China R. Int.	M	People in the Know
		F	Life in China

R. Australia

		W	The Religion Report
	R. Canada Int.	F	C'est La Vie (life in Quebec)
1532	Voice of Russia	S	Kaleidoscope (Russian events)
		F	Moscow Yesterday and Today
1545	R. Canada Int.	M-H	Out Front (experimental radio)

Informational Features

1505	R. Australia	S	Encounter (spiritual beliefs)
1520	China R. Int.	H	Voices from Other Lands
1530	BBCWS(am)	M	People and Places
		T	The Essential Guide
		W	Everywoman
		H	Focus on Faith
		F	Pick of the World (best of the BBC)

Music

1505	R. Australia	A	Melisma (innovative)
1532	Voice of Russia	M	Folk Box
		T/H	Yours for the Asking
		W	Jazz Show
1546	Voice of Russia	T/H	Music at Your Request

Entertainment/Variety, Magazine Shows

1500	HCJB	A	Alive! (from 1430)
1505	R. Canada Int.	A	Basic Black (from 1405)
1530	HCJB	A	Weekend Magazine
1532	Voice of Russia	A	Timelines

SWL, Media and Communications

1530	R. Australia	H	The Media Report
	WHRI(6040 kHz)	S/A	DXing with Cumbre

Listener Contact/Interactive

1520	China R. Int.	A	Listeners' Garden
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Sport

1505	BBCWS(am)	F	Sports International
		A	Sportsworld (from 1405)
1530	China R. Int.	T	Sports World
		F	The Sports Factor

Continued from 0500

Entertainment/Variety, Magazine Shows

0500	HCJB	M	Sunday Nite
		H	Adventures in Odyssey (stories)
	WBCQ(7315 kHz)	M-A	Amos 'n Andy (classic comedy)
0505	R. New Zealand Int.	S	Storytime
0532	Voice of Russia	F	Audio Book Club
		A	Timelines

SWL, Media and Communications

0530	WHRI(5745 kHz)	S	DXing with Cumbre
0540	R. Habana Cuba	S/W	DXers Unlimited
0547	Spanish Foreign R.	S	Radio Waves

IT'S BACK AND BETTER THAN EVER

The Worldwide Shortwave Listening Guide

Edited by John Figliozi

A "must" reference for every
shortwave program listener!



FREQUENCIES

1600 1610	Vatican City, Vatican Radio	9865au	13765au	15235au		1600 1700	New Zealand, ZLXA	3935do			
1600 1615	Pakistan, Radio	11570va	15100va	15725va	17720va	1600 1700 vl	Nigeria, Radio/Enugu	6025do			
1600 1625	Netherlands, Radio	12070as	12095as	15595as		1600 1700 vl	Nigeria, Radio/Ibadan	6050do			
1600 1627	Iran, VOIRI	7115as	9635as	11775na		1600 1700 vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
1600 1627	Vietnam, Voice of	7145eu	9730eu			1600 1700 vl	Nigeria, Radio/Lagos	3326do	4990do		
1600 1630	Ecuador, HCJB	12005am	15115va			1600 1700 vl	Nigeria, Voice of	7255af	15120af		
1600 1630 s	Germany, Universal Life	15105af				1600 1700	Palau, KHBN/Voice of Hope	9955as	9965as	13840as	
1600 1630	Guam, Trans World Radio	15330as				1600 1700	Russia, Voice of Russia WS	4940me	4965me	4975me	6005me
1600 1630	Mexico, R Mexico International	9705am	11770am				7305as	9830me			
1600 1630	S Africa, Channel Africa	9525af				1600 1700	S Africa, World Beacon	6145af			
1600 1630 vl	Zimbabwe, Zimbabwe BC Corp	5975do	6045do			1600 1700	Sierra Leone, Sierra Leone BS	5980do			
1600 1640	UAE, Radio Dubai	13675eu	15395eu	21605eu		1600 1700	South Korea, R Korea Intl	5975am	9515va	9870va	
1600 1645	Germany, Deutsche Welle	6170as	7225as	9735af	15380as	1600 1700	Sri Lanka, Sri Lanka BC Corp	4940do			
		15455af	17810as	21780af		1600 1700	Uganda, Radio	4976do	5026do		
1600 1650 occsnal	New Zealand, R New Zealand Int	6095va				1600 1700	UK, BBC World Service	3915as	5975as	6190af	6195as
1600 1656	China China Radio International	7190af	13650af				7160as	9410eu	9740eu	11940af	12095eu
1600 1656	North Korea, R Pyongyang	3560va	6520va	9600va	9975va		15310as	15400af	15420af	15565eu	17700as
1600 1700	Algeria, R Algiers International	11715va	15160va				17830af	16740am	21470af	21660af	
1600 1700	Anguilla, Caribbean Beacon	11775am				1600 1700 mtwhfa	UK, BBC World Service	9515na			
1600 1700 vl	Australia, ABC/Alice Springs	2310do				1600 1700 a	UK, Flat Earth Radio/Merlin	15525eu	15665na	21515af	
1600 1700 vl	Australia, ABC/Katherine	2485do				1600 1700	UK, World Beacon	15455eu			
1600 1700 vl	Australia, ABC/Tennant Creek	2325do				1600 1700	USA, Armed Forces Radio	4278va	4319va	4993va	5765va
1600 1700	Australia, Radio	5995va	6080pa	9580va	9655va		6350va	6458va	6847va	10320va	10940va
		11650pa					12579va	12689va	13362va	16847va	
1600 1700 vl	Botswana, Radio	3356do	4820do	7255do		1600 1700	USA, KAU Dallas TX	13815va			
						1600 1700	USA, KJES Vado NM	11715na			
1600 1700 vl	Cameroon, RTV/Yaounde	4850do				1600 1700	USA, KTBN Salt Lake City UT	15590na			
1600 1700	Canada, CBC Northern Service	9625do				1600 1700	USA, KWHR Naalehu HI	9930as			
1600 1700	Canada, CFRX Toronto ON	6070do				1600 1700	USA, VOA Special English	13600af	15445af	17895af	
1600 1700	Canada, CFVP Calgary AB	6030do									
1600 1700	Canada, CHNX Halifax, NS	6130do				1600 1700	USA, Voice of America	6035af	6110as	7125as	9575as
1600 1700	Canada, CKZN St John's NF	6160do					9645as	9760as	11920af	12040af	13710af
1600 1700	Canada, CKZU Vancouver BC	6160do					15205as	15225af	15240af	15375na	15745na
1600 1700	Costa Rica, R for Peace Intl	15048va	21815usb			1600 1700	USA, WEWN Birmingham AL	11875na			
1600 1700	Costa Rica, University Network	15048va	21815usb			1600 1700	USA, WHRA Greenbush ME	17650af			
1600 1700	Ethiopia, Radio	7165af	9560af			1600 1700	USA, WHRI Noblesville IN	13760na	15105na		
1600 1700 a/monthly	Finland, Scandy Weekend Radio	11690va	11720va			1600 1700	USA, WINB Red Lion PA	13570eu			
1600 1700	France, R France International	11615af	11995af	12015af	15210af	1600 1700	USA, WJCR Upton KY	7490va	13595as		
		17850af				1600 1700	USA, WRMI Miami FL	15725am			
1600 1700	Germany, Deutsche Welle	6140eu				1600 1700	USA, WSHB Cypress Crk SC	18910af			
1600 1700 a	Germany, Good News World R	15105af				1600 1700	USA, WTJC Newport NC	9370na			
1600 1700	Germany, Overcomer Ministries	6110eu	13810af			1600 1700	USA, WWCN Nashville TN	9475am	12160am	13845am	15685am
1600 1700 vl	Ghana, Ghana BC Corp	4915do	6130do			1600 1700	USA, WWFV McCaysville GA	9400am	12172am		
1600 1700	Guam, Adventist World Radio	11980as				1600 1700	USA, WYFR Okeechobee FL	11830na	15215na	17760na	18980eu
1600 1700	Guyana, Voice of	5949do					21455eu	21525af			
1600 1700 vl/as	Italy, IRRS	7120va				1600 1700	Zambia, Christian Voice	4965do			
1600 1700	Jordan, Radio	17680na				1600 1700 vl	Zambia, National BC Corp	6165do	6265do		
1600 1700	Kenya, Kenya BC Corp	4935do				1615 1630 as	UK, BBC World Service	11860af	21490af		
1600 1700 vl	Lesotho, Radio	4800do				1630 1700	Egypt, Radio Cairo	15255af			
1600 1700 vl	Liberia, ELWA	4760do				1630 1700 s	Seychelles, FEBA Radio	11605as			
1600 1700 vl	Liberia, R Liberia International	6100do				1630 1700	Somalia, Radio Galkayo	6985va			
1600 1700	Liberia, Voice of Hope	11530af				1630 1700 mtwhf	UK, Merlin Network One	12065as			
1600 1700 vl	Malawi, Malawi BC Corp	3380do				1630 1700 vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do		
1600 1700	Malaysia, Radio	7295do				1645 1700	Bangladesh, Bangla Betar	7184eu	7462eu	9550eu	15520eu
1600 1700	Namibia, Namibian BC Corp	7165af	7215af			1650 1700 mtwhf	New Zealand, R New Zealand Int	15120as			

SELECTED PROGRAMS

Newscasts (*extended)

1600	BBCWS(am)	S	News Summary
		M-F	World Briefing*
		A	News
	R. Australia	D	News

Current Events Magazines/Features

1630	BBCWS(am)	M/T/H/F	News Analysis
		W	From Our Own Correspondent
	R. Austria Int.	D	Report from Austria

Local Lives and Views

1605	R. Australia	S	The National Interest
		T	The Comfort Zone (homes/gardens/food)
		W	Verbatim (oral histories)
		H	Hindsight (history)
		F	Away! (Aboriginal culture)
1630	R. Australia	W	Earshot (Australian voices)
1640	R. Austria Int.	S	Profile of Austria
		A	Radio E (on Europe)

Music

1601	BBCWS(am)	S	Concert Hall (classical)
1602	WHRI(15105 kHz)	A	20: The Countdown Magazine (Christian rock)
1605	R. Australia	M	Music Deli
		A	Melisma (from 1505)

SWL, Media and Communications

1600	WHRI(15105 kHz)	S	DXing with Cumbre
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Sport

1605	BBCWS(am)	A	Sportsworld (from 1405)
1645	BBCWS(am)	M-F	Sports Roundup

Continued from 0100

Music

0100	WBCQ(7415 kHz)	A	A Different Kind of Oldies Show
	WWCR(5070 kHz)	M	Big Band Classics
0105	BBCWS(am)	H	Meridian-Music
		A	Meridian-Masterpiece
	R. Australia	A	Oz Sounds
	R. New Zealand Int.	A	Home Grown (from 0005)
	R. Prague	S	Saturday Music (classical/folk/jazz)
	Swiss R. Int.	S	Sounds Good (Swiss music)*
0110	Swiss R. Int.	S	Music
0120	Voice of Vietnam	S	Flamenco
0128	Spanish Foreign R.	M	Spanish Pop Music
0130	BBCWS(am)	T-A	Music Mix
		W	UK Top 20
		F	World of Music
	HCJB	A	Musica del Ecuador
0140	Swiss R. Int.	S	Sounds Good (Swiss music)*
0145	BBCWS(am)	H	UK Album Chart
		A	Music X-Press (*3rd/5th wks.)

Entertainment/Variety, Magazine Shows

0100	WBCQ(7415 kHz)	M	Radio NY International
		H	Idio-Audio
		A	Allan Weiner Worldwide

0110	Voice of Vietnam	S	Sunday Show
0130	BBCWS(am)	H/A	Westway (drama serial)

SWL, Media and Communications

0100	WBCQ(7415 kHz)	F	Radio Detective (antique radio)
	WWCR(3215 kHz)	M	World of Radio
0109	HCJB	S	DX Partyline
0130	HCJB	H	Ham Radio Today
	WWCR(3215 kHz)	A	World of Radio
0133	VOA News Now	S	Communications World
0140	R. Habana Cuba	S/W	DXers Unlimited
0147	Spanish Foreign R.	S	Radio Waves

Listener Contact/Interactive

0110	HCJB	M	Musical Mailbag
	R. Prague	A	Mailbox
	Swiss R. Int.	S	Capital Letters (2nd/4th wk.)
0115	Voice of Vietnam	H	Letterbox
0120	China R. Int.	A	Listeners' Garden
0130	R. Habana Cuba	M	Mailbag Show
0135	Spanish Foreign R.	A	Radio Club
0140	R. Habana Cuba	H	Mailbag Show
	Swiss R. Int.	S	Capital Letters (2nd/4th wk.)
0147	Spanish Foreign R.	M	Radio Club

Sport

0115	Deutsche Welle	F	Spotlight on Sport
0118	VOA News Now	T-A	Sports Report
0130	China R. Int.	T	Sports World
	RTE Ireland	S/M	Sportsnews
0135	R. Habana Cuba	T-A	Time Out
0135	R. New Zealand Int.	S/A	Live Sport (in season)

FREQUENCIES

1700	1727		Czech Rep, Radio Prague Intl	5930eu	17485af		1800	1827		Czech Rep, Radio Prague Intl	5930eu	7315va			
1700	1727		Vietnam, Voice of	12070eu			1800	1827		Vietnam, Voice of	7440eu	9730eu			
1700	1730		France, R France International	11615af	15210af		1800	1830		Egypt, Radio Cairo	15255af				
1700	1730		Jordan, Radio	17860af			1800	1830		S Africa, Adventist World Radio	5960af	6100af			
1700	1730		S Africa, Channel Africa	17860af			1800	1830		S Africa, Channel Africa	17870af				
1700	1730	a	UK, Fiat Earth Radio/Merlin	15525eu	15665na	21515af	1800	1830		UK, BBC World Service	32255af	5975as	6190af	6195eu	
1700	1730	mtwhf	UK, Merlin Network One	12065as			1800	1830			9410eu	9510as	9740pa	15400af	15420af
1700	1756		China China Radio International	7150af	9570af	9670af	9695af				15575me	17830af	17840na	21470af	
			9795af	11910af											
1700	1756		Romania, R Romania International	9625eu				1800	1830		UK, RTE Radio	9895me			
1700	1800		Anguilla, Caribbean Beacon	11775am				1800	1850	mtwhf	New Zealand, R New Zealand Int	15120as			
1700	1800	vl	Australia, ABC/Alice Springs	2310do				1800	1859		Canada, R Canada International	11720af	13640af		
1700	1800	vl	Australia, ABC/Katherine	2485do				1800	1859		Poland, Radio Polonia	5995eu	7285eu		
1700	1800	vl	Australia, ABC/Tennant Creek	2325do				1800	1900		Anguilla, Caribbean Beacon	11775am			
1700	1800		Australia, Radio	5995va	6080pa	9580va	9655va	1800	1900	mtwhf	Argentina, RAE	15345eu			
			9815as	11880va				1800	1900	vl	Australia, ABC/Alice Springs	2310do			
1700	1800		Bangladesh, Bangla Betar	7184eu	7462eu	9550eu	15520eu	1800	1900	vl	Australia, ABC/Katherine	2485do			
1700	1800	vl	Botswana, Radio	3356do	4820do			1800	1900	vl	Australia, ABC/Tennant Creek	2325do			
1700	1800	vl	Cameroon, RTV/Yaounde	4850do				1800	1900	vl	Australia, Radio	6080as	7240pa	9580va	9655va
1700	1800		Canada, CBC Northern Service	9625do							9815as	11880va			
1700	1800		Canada, CFRX Toronto ON	6070do				1800	1900	vl	Botswana, Radio	3356do	4820do		
1700	1800		Canada, CFVP Calgary AB	6030do				1800	1900	vl	Cameroon, RTV/Yaounde	4850do			
1700	1800		Canada, CHNX Halifax, NS	6130do				1800	1900		Canada, CBC Northern Service	9625do			
1700	1800		Canada, CKZN St John's NF	6160do				1800	1900		Canada, CFRX Toronto ON	6070do			
1700	1800		Canada, CKZU Vancouver BC	6160do				1800	1900		Canada, CFVP Calgary AB	6030do			
1700	1800		Costa Rica, R for Peace Intl	15048va	21815usb			1800	1900		Canada, CHNX Halifax, NS	6130do			
1700	1800		Costa Rica, University Network	15048va	21815usb			1800	1900		Canada, CKZN St John's NF	6160do			
1700	1800		Egypt, Radio Cairo	15255af				1800	1900		Canada, CKZU Vancouver BC	6160do			
1700	1800	mtwhf	Eqt Guinea, Radio Africa	15185af				1800	1900		Costa Rica, R for Peace Intl	15048va	21815usb		
1700	1800	a/monthly	Finland, Scandv Weekend Radio	11690va	11720va			1800	1900		Costa Rica, University Network	15048va	21815usb		
1700	1800	a	Germany, Deutsche Welle	6140eu											
1700	1800		Germany, Good News World R	11795me				1800	1900	mtwhf	Eqt Guinea, Radio Africa	15185af			
1700	1800		Germany, Overcomer Ministries	13810me				1800	1900	a/monthly	Finland, Scandv Weekend Radio	11690va	11720va		
1700	1800		Germany, Voice of Hope	9495me				1800	1900		Germany, Deutsche Welle	6140eu			
1700	1800	vl	Ghana, Ghana BC Corp	3366do	4915do			1800	1900		Germany, Voice of Hope	9495va	11735af		
1700	1800	a	Greece, Voice of	9420eu	15630na			1800	1900		Ghana, Ghana BC Corp	3366do	4915do		
1700	1800		Guyana, Voice of	5949do				1800	1900	vl	Guyana, Voice of	5949do			
1700	1800		Israel, Kol Israel	11605va	17545va			1800	1900		India, All India Radio	7410as	9950as	11620as	11935as
1700	1800		Japan, Radio	9505na	11970eu	15355af		1800	1900			15200af	17670af		
1700	1800		Kenya, Kenya BC Corp	4935do							13790af				
1700	1800	vl	Lesotho, Radio	4800do				1800	1900	vl	Italy, IRRS	3985va			
1700	1800	vl	Liberia, ELWA	4760do				1800	1900		Kenya, Kenya BC Corp	4935do			
1700	1800	vl	Liberia, R Liberia International	6100do				1800	1900		Kuwait, Radio	11990va			
1700	1800		Liberia, Voice of Hope	11530af				1800	1900	vl	Lesotho, Radio	4800do			
1700	1800	vl	Malawi, Malawi BC Corp	3380do				1800	1900	vl	Liberia, ELWA	4760do			
1700	1800		Malaysia, Radio	7295do				1800	1900	vl	Liberia, R Liberia International	5100do			
1700	1800		Namibia, Namibian BC Corp	3270af	3289af			1800	1900	vl	Liberia, Voice of Hope	11530af			
1700	1800	mtwhf	New Zealand, R New Zealand Int	15120as				1800	1900	vl	Malawi, Malawi BC Corp	3380do			
1700	1800		New Zealand, ZLXA	3935do				1800	1900		Malaysia, Radio	7295do			
1700	1800	vl	Nigeria, Radio/Enugu	6025do				1800	1900		Namibia, Namibian BC Corp	3270af	3289af		
1700	1800	vl	Nigeria, Radio/Ibadan	6050do				1800	1900		Netherlands, Radio	6020af	11655af		
1700	1800	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	1800	1900		New Zealand, ZLXA	3935do			
1700	1800	vl	Nigeria, Radio/Lagos	3326do	4990do			1800	1900	vl	Nigeria, Radio/Enugu	6025do			
1700	1800		Palau, KHBN/Voice of Hope	9955as	9965as	13840as		1800	1900	vl	Nigeria, Radio/Ibadan	6050do			
1700	1800		Russia, Voice of Russia WS	9830me				1800	1900	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
1700	1800		S Africa, World Beacon	6145af				1800	1900	vl	Nigeria, Radio/Lagos	3326do	4990do		
1700	1800		Sierra Leone, Sierra Leone BS	5980do				1800	1900	vl	Palau, KHBN/Voice of Hope	9965as	13840as		
1700	1800	irreg	Sri Lanka, Sri Lanka BC Corp	4940do				1800	1900		Philippines, Radyo Pilipinas	11720me	15190me	17720me	
1700	1800		Sudan, Radio Omdurman	7199do	9200do	9505do		1800	1900	as	Russia, Voice of Russia WS	5940eu	6045eu		
1700	1800		Uganda, Radio	4976do	5026do			1800	1900		Russia, Voice of Russia WS	7340eu	9775eu	9830af	9890eu
1700	1800		UK, BBC World Service	6190af	6195eu	5975as	6005af				11510af				
				9630af	7160as	9410eu	9510as								
				17830af	9740as	15400af	15420af								
					17840na	21470af									
					15455eu			1800	1900	m	S Africa, Amateur World League	3215af			
1700	1800		UK, World Beacon	4278va	4319va	4993va	5765va	1800	1900		S Africa, World Beacon	3230af	11640af		
1700	1800		USA, Armed Forces Radio	6458va	6847va	10320va	10940va	1800	1900		Sierra Leone, Sierra Leone BS	5980do			
				6350va	6458va	10320va	10940va	1800	1900	irreg	Sri Lanka, Sri Lanka BC Corp	4940do			
				12579va	13362va	16847va		1800	1900		Swaziland, Trans World Radio	3200af	9500af		
1700	1800		USA, KAIJ Dallas TX	13815va				1800	1900		Taiwan, R Taiwan International	3955eu			
1700	1800		USA, KTBN Salt Lake City UT	15590na				1800	1900		Uganda, Radio	4976do	5026do		
1700	1800		USA, KWHR Naelehu HI	9930as				1800	1900	mtwhf	UK, Merlin Network One	6130af	12065as		
1700	1800		USA, Voice of America	9760as	11920af	12040af	15205as	15240af	1800	1900	UK, World Beacon	15585af	17665af		
				15395as	15455af	17895af			1800	1900	USA, Armed Forces Radio	4278va	4319va	4993va	5765va
1700	1800	mtwhf	USA, Voice of America	5990as	6045as	9525as	9670as				6350va	6458va	6847va	10320va	10940va
				9795as	11955as	12005as	15255as				12579va	12689va	13362va		
1700	1800		USA, WEWN Birmingham AL	11875na	13615na	15375na	15745na	1800	1900		USA, KAIJ Dallas TX	13815va			
1700	1800		USA, WHRA Greenbush ME	17650af				1800	1900		USA, KTBN Salt Lake City UT	15590na			
1700	1800		USA, WHRI Noblesville IN	13760as	15105na			1800	1900		USA, KWHR Naelehu HI	9930as			
1700	1800		USA, WINB Red Lion PA	13570eu				1800	1900		USA, Voice of America	6035af	6040af	9565as	9760as
1700	1800		USA, WJCR Upton KY	7490va	13595as						11920af	11975af	13710af	15240af	15580af
1700	1800		USA, WMLK Bethel PA	15265eu				1800	1900		USA, WHRA Greenbush ME	17650af	13615na	15375na	15745na
1700	1800		USA, WRMI Miami FL	15725am				1800	1900		USA, WHRI Noblesville IN	9495as	13760na		
1700	1800		USA, WSHB Cypress Crk SC	18910af				1800	1900		USA, WINB Red Lion PA	13570eu			
1700	1800		USA, WTJC Newport NC	9370na				1800	1900		USA, WJCR Upton KY	7490va	13595as		
1700	1800		USA, WWCR Nashville TN	9475am	12160am	13845am	15685am	1800	1900		USA, WMLK Bethel PA	15265eu			
1700	1800		USA, WWVF McCaysville GA	9400am	12172am			1800	1900		USA, WRMI Miami FL	15725am			
1700	1800		USA, WYFR Okeechobee FL	18980eu	21455eu			1800	1900		USA, WSHB Cypress Crk SC	15665eu	18910af		
1700	1800	vl	Zambia, Christian Voice	4965do				1800	1900		USA, WTJC Newport NC	9370na			
1700	1800	vl	Zambia, National BC Corp	6165do	6265do										
1700	1800	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do										
1715	1730		Vatican City, Vatican Radio	4005eu	5883eu	7250eu	9645eu								
				15595eu											
1725	1740		Armenia, Trans World Radio	5855me				1800	1900		USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1725	1740		Germany, Trans World Radio	5855eu				1800	1900		USA, WWVF McCaysville GA	9400am	12172am		
1725	1740	vl	Monaco, Trans World Radio	6145me				1800	1900		USA, WYFR Okeechobee FL	18980eu			
1730	1745		Libya, Voice of Africa	11815af	17725af			1800	1900		Yemen, Ref of Yemen Radio	9779me			
1730	1745	mtwhf	Swaziland, Trans World Radio	9500af				1800	1900		Zambia, Christian Voice	4965do			
1730	1745		Swaziland, Trans World Radio	3200af				1800	1900	vl	Zambia, National BC Corp	6165do	6265do		
1730	1745		United Nations, UN Radio	6125af	15265af	17710af		1800	1900	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do		
1730	1800		Guam, Adventist World Radio	7455as	11560me			1830	1900		Ascension Is, RTE Radio	21630af			
1730	1800		Netherlands, Radio	6020af	11655af			1830	1900		Belgium, Radio Vlaanderen Intl	5910eu	9925eu	13710eu	
1730															

FREQUENCIES

1900	1915		Congo, RTV Congolaise	5985do				2000	2015		Swaziland, Trans World Radio	3200af			
1900	1927		Vietnam, Voice of	7145eu	9730eu			2000	2025		Netherlands, Radio	6020af	11655af	13700af	17605af
1900	1930		Iran, VOIRI	7255me	7750me			2000	2027		Iran, VOIRI	6110eu	7215eu	7255eu	9022eu
1900	1930		Philippines, Radio Pilipinas	11720me	15190me	17720pa		2000	2030		Hungary, Radio Budapest	6025eu	7135eu		
1900	1945		Germany, Deutsche Welle	11765af	11810af		15135af	2000	2030		Israel, Kol Israel	6280va	9435va	15640va	15650va
				15390af	17810af			2000	2030		Mongolia, Voice of	12015eu	12085eu		
1900	1945		India, All India Radio	13790af	9950as	11620as	11935as	2000	2030		Switzerland, Swiss R International	6165af	9605af	11910af	13660af
				15200af	17670af			2000	2030		Turkey, Voice of	6140as	7240as		
1900	1956		China China Radio International	6165af	9440af	9585af		2000	2030		USA, Voice of America	4950af	6035af	6095as	7415af
1900	2000		Anguilla, Caribbean Beacon	11775am						9690as	9760as	1185saf	1197saf	13710af	
1900	2000	vl	Australia, ABC/Katherine	2485do				2000	2030		Vatican City, Vatican Radio	15580af	1772saf	1788saf	
1900	2000	vl	Australia, ABC/Tennant Creek	2325do				2000	2045		Germany, Deutsche Welle	9725eu	1162saf	1376saf	
1900	2000		Australia, Radio	6080as	7240pa	9500as	9580va	2000	2045		Iraq, Radio Iraq International	9684va	11785va		
				11880va				2000	2056		China China Radio International	5965eu	9440af	9840eu	11735af
1900	2000	vl	Botswana, Radio	3356do	4820do					13640af					
1900	2000	vl	Cameroon, RTV/Yaounde	4850do				2000	2100		Algeria, R Algiers International	11715eu	15160eu		
1900	2000		Canada, CFRX Toronto ON	6070do				2000	2100		Angola, R. Nacional de Angola	3374va	7245va		
1900	2000		Canada, CFVP Calgary AB	6030do				2000	2100	vl	Anguilla, Caribbean Beacon	11775am			
1900	2000		Canada, CHNX Halifax, NS	6130do				2000	2100		Australia, ABC/Alice Springs	2310do			
1900	2000		Canada, CKZN St John's NF	6160do				2000	2100		Australia, ABC/Katherine	2485do			
1900	2000		Canada, CKZU Vancouver BC	6160do				2000	2100		Australia, ABC/Tennant Creek	2325do			
1900	2000		Canada, CBC Northern Service	9625do						12080pa	9500as	9580va	9815as	11880va	
1900	2000		Costa Rica, R for Peace Intl	15048va	21815usb			2000	2100	as	Australia, Radio	6080as	7240pa		
1900	2000		Costa Rica, University Network	15048va	21815usb			2000	2100	vl	Botswana, Radio	3356do	4820do		
1900	2000		Ecuador, HCJB	17660eu				2000	2100		Bulgaria, Radio	7200eu	7500eu		
1900	2000		Eqt Guinea, Radio Africa	15185af				2000	2100	vl	Cameroon, RTV/Yaounde	4850do			
1900	2000	mtwhf	Finland, Scandv Weekend Radio	11690va	11720va			2000	2100		Canada, CBC Northern Service	9625do			
1900	2000	a/monthly	Germany, Voice of Hope	7290eu	11735af			2000	2100		Canada, CFRX Toronto ON	6070do			
1900	2000		Ghana, Ghana BC Corp	3366do	4915do			2000	2100		Canada, CFVP Calgary AB	6030do			
1900	2000	vl	Italy, IRRS	3985va				2000	2100		Canada, CHNX Halifax, NS	6130do			
1900	2000	vl	Kenya, Kenya BC Corp	4935do				2000	2100		Canada, CKZN St John's NF	6160do			
1900	2000		Kuwait, Radio	11990va				2000	2100		Canada, CKZU Vancouver BC	6160do			
1900	2000		Lesotho, Radio	4800do				2000	2100		Costa Rica, R for Peace Intl	15048va	15065va	21815usb	
1900	2000	vl	Liberia, ELWA	4760do				2000	2100		Costa Rica, University Network	15048va	15065va	21815usb	
1900	2000	vl	Liberia, R Liberia International	5100do				2000	2100	mtwhf	Ecuador, HCJB	17660eu			
1900	2000	vl	Liberia, Voice of Hope	11530af				2000	2100	a/monthly	Eqt Guinea, Radio Africa	15185af			
1900	2000		Malawi, Malawi BC Corp	3380do				2000	2100		Finland, Scandv Weekend Radio	11690va	11720va		
1900	2000	vl	Malaysia, Radio	7295do				2000	2100	vl	Germany, Voice of Hope	7290eu	11735af		
1900	2000		Namibia, Namibian BC Corp	3270af	3289af	13700af	17605af	2000	2100		Ghana, Ghana BC Corp	3366do	4915do		
1900	2000		Netherlands, Radio	6020af	11655af			2000	2100	vl	Indonesia, Voice of	9525va	11785va	15149va	
1900	2000		New Zealand, R New Zealand Int	17675pa				2000	2100		Italy, IRRS	3985va			
1900	2000		New Zealand, ZLXA	3935do				2000	2100		Kenya, Kenya BC Corp	4935do			
1900	2000	vl	Nigeria, Radio/Enugu	6025do				2000	2100	vl	Kuwait, Radio	11990va			
1900	2000	vl	Nigeria, Radio/Ibadan	6050do				2000	2100	vl	Lesotho, Radio	4800do			
1900	2000	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do	2000	2100	vl	Liberia, ELWA	4760do			
1900	2000	vl	Nigeria, Radio/Lagos	3326do	4990do			2000	2100	vl	Liberia, R Liberia International	5100do			
1900	2000	vl	Nigeria, Voice of	7255af	15120af			2000	2100	vl	Malawi, Malawi BC Corp	3380do			
1900	2000		North Korea, R Pyongyang	4405va	6574na	9335na	11710na	2000	2100	mtwhf	Malaysia, Radio	7295do			
				13760na				2000	2100	mtwhf	Malta, Voice of Mediterranean	7440eu			
1900	2000		Russia, Voice of Russia WS	5940eu	5950eu	6045eu	7205eu	2000	2100	vl	Namibia, Namibian BC Corp	3270af	3289af		
				7340eu	9875af	9890eu	11510af	2000	2100	vl	New Zealand, R New Zealand Int	17675pa			
1900	2000		Russia, World Beacon	7360eu				2000	2100	vl	New Zealand, ZLXA	3935do	7290do		
1900	2000		S Africa, World Beacon	3230af	11640af			2000	2100	vl	Nigeria, Radio/Enugu	6025do			
1900	2000		Sierra Leone, Sierra Leone BS	3316do				2000	2100	vl	Nigeria, Radio/Ibadan	6050do			
1900	2000	vl	Solomon Islands, SIBC	5020do				2000	2100	vl	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
1900	2000	irreg	South Korea, R Korea Intl	5975am	7275eu			2000	2100	vl	Nigeria, Radio/Lagos	3326do	4990do		
1900	2000	a	Sri Lanka, Sri Lanka BC Corp	4940do				2000	2100	vl	Nigeria, Voice of	7255af	15120af		
1900	2000		Sri Lanka, Sri Lanka BC Corp	6010eu				2000	2100	vl	Papua New Guinea, NBC	4890do			
1900	2000		Swaziland, Trans World Radio	3200af				2000	2100	vl	Russia, Voice of Russia WS	5940eu	5950eu	6045eu	7340eu
1900	2000		Thailand, Radio	9535eu				2000	2100		USA, Armed Forces Radio	6350va	6847va	10320va	10940va
1900	2000		Uganda, Radio	4976do	5026do	6190af	6195af	2000	2100		USA, KAIJ Dallas TX	12579va	12689va	13362va	16847va
1900	2000		UK, BBC World Service	3255af	6005af			2000	2100		USA, KJES Vado NM	15385au			
				9410eu	9630af	15400af	15575as	2000	2100		USA, KTNB Salt Lake City UT	15590na			
1900	2000		UK, BBC World Service	17840na				2000	2100		USA, KWHR Naelehu HI	17510as	13615na	15375na	15745na
1900	2000	a	UK, Merlin Network One	6130af				2000	2100	vl	USA, WEWN Birmingham AL	11875na			
1900	2000		UK, World Beacon	9675eu	15585eu			2000	2100	irreg	USA, WHRA Greenbush ME	17650af			
1900	2000	hf	USA, Armed Forces Radio	4278va	4319va	4993va	5765va	2000	2100		USA, WHRI Noblesville IN	5745sa	9495sa	13760na	
				6350va	6458va	10320va	10940va	2000	2100		USA, WINB Red Lion PA	13570eu			
1900	2000		USA, KAIJ Dallas TX	13815va				2000	2100		USA, WJCR Upton KY	7490va	13595as		
1900	2000		USA, KJES Vado NM	15385na				2000	2100		USA, WMLK Bethel PA	15265eu			
1900	2000		USA, KTNB Salt Lake City UT	15590na				2000	2100		USA, WRMI Miami FL	15725am			
1900	2000		USA, KWHR Naelehu HI	9930as				2000	2100		USA, WTJC Newport NC	9370na			
1900	2000		USA, VOA Special English	9785me	12015me	13640me		2000	2100		USA, WWCR Nashville TN	9475am	12160am	13845am	15685am
1900	2000		USA, Voice of America	4950af	6035af	7415af	9525pa	2000	2100		USA, WWFV McCaysville GA	9400am	12172am		
				9690as	11870pa	11920af	11975af	2000	2100	vl	USA, WYFR Okeechobee FL	7355eu	15565eu	7260do	
1900	2000		USA, WEWN Birmingham AL	11875na	13615na	15375na	15745na	2000	2100		Venezuela, Radio	3945do	4960do		
1900	2000		USA, WHRA Greenbush ME	17650af				2000	2100	vl	Zambia, Christian Voice	4965do			
1900	2000		USA, WINB Red Lion PA	13570eu				2000	2100	vl	Zambia, National BC Corp	6165do	6265do		
1900	2000		USA, WJCR Upton KY	7490va	13595as			2000	2100	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do		
1900	2000		USA, WMLK Bethel PA	15265eu				2000	2100		USA, WSHB Cypress Crk SC	11550eu	15665af		
1900	2000		USA, WRMI Miami FL	15725am				2025	2045		Italy, RAI International	7220af	9710af	11880af	
1900	2000		USA, WSHB Cypress Crk SC	15665eu	18910af			2030	2045	vl	Libya, Voice of Africa	11815af	1772saf		
1900	2000		USA, WTJC Newport NC	9370na				2030	2045		Thailand, Radio	9535eu			
1900	2000		USA, WWCR Nashville TN	9475am	12160am	13845am	15685am	2030	2057		Vietnam, Voice of	7145eu	9730eu		
1900	2000		USA, WWFV McCaysville GA	9400am	12172am			2030	2100	t h	Belarus, R Belarus International	7105eu	7210as		
1900	2000		USA, WYFR Okeechobee FL	18980eu				2030	2100		Cuba, Radio Havana	13600eu	13750eu		
1900	2000		Zambia, Christian Voice	4965do				2030	2100		Egypt, Radio Cairo	15375af			
1900	2000	vl	Zambia, National BC Corp	6165do	6265do			2030	2100		Germany, Adventist World Radio	9615af			
1900	2000	vl	Zimbabwe, Zimbabwe BC Corp	4828do	6045do			2030	2100		Poland, Radio Polonia	6030eu	7185eu	7265eu	9540eu
1903	2000	s	Greece, Voice of	7455eu	9420eu	17565sa	17705na	2030	2100		S Africa, Adventist World Radio	9745af			
1915	1925		Rwanda, Radio	6055do				2030	2100		Sweden, Radio	6065va	9445va		
1930	1955		Greece, Voice of	7475eu	9375eu			2030	2100		USA, Voice of America	6035af	6095as	7415af	9690as
1930	2000		Austria, R Austria International	5945eu	6155eu			2030	2100	as		11975af	13710af	15240af	15580af
1930	2000		Iran, VOIRI	6110eu	7215eu	7255eu	9022eu	2030	2100		USA, Voice of America	4950af			
1930	2000	vl	Papua New Guinea, NBC	4890do				2040	2050	m	USA, Voice of America	7105eu	9540eu		
1930	2000		Slovakia, R Slovakia International	5915eu	6055eu	7345eu		2040	2100	mtwhf	Vatican City, Vatican Radio	9645eu			
1930	2000		Switzerland, Swiss R International	9605af	11910af	13660af		2040	2100		Armenia, Voice of	4810eu	9965eu		
1930	2000		Turkey, Voice of	6140as	7240as			2045	2100		India, All India Radio	7150au	7410eu	9650eu	9910au
1935	1955														



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2100	2110	Kenya, Kenya BC Corp	4935do			
2100	2110	Vatican City, Vatican Radio	4005eu	5883eu	7250eu	
2100	2127	Czech Rep, Radio Prague Intl	5930va	9430va		
2100	2129	Poland, Radio Polonia	6030eu	7185eu	7265eu	9540eu
2100	2130	Australia, ABC/Alice Springs	2310do			
2100	2130	Australia, ABC/Katherine	2485do			
2100	2130	Australia, ABC/Tennant Creek	2325do			
2100	2130	Australia, Radio	7240pa	9500as	9580va	9660pa
			12080pa	17715va	21740va	
2100	2130	China China Radio International	5965eu	9840eu	11735af	13640af
2100	2130	Cuba, Radio Havana	13660eu	13750eu		
2100	2130	UK, BBC World Service	5975ca			
2100	2145	Germany, Deutsche Welle	9615af	9690af	9765va	15135va
			15410va	17560va	17835af	
2100	2156	North Korea, R Pyongyang	6574va	9335va		
2100	2156	Romania, R Romania International	5955eu	7195eu	7215eu	9690eu
2100	2159	Canada, R Canada International	5995eu	7235eu	9770eu	9805eu
			13650eu			
2100	2200	Anguilla, Caribbean Beacon	11775am			
2100	2200	Botswana, Radio	3356do	4820do		
2100	2200	Cameroon, RTV/Yaounde	4850do			
2100	2200	Canada, CBC Northern Service	9625do			
2100	2200	Canada, CFRX Toronto ON	6070do			
2100	2200	Canada, CFVP Calgary AB	6030do			
2100	2200	Canada, CHNX Halifax, NS	6130do			
2100	2200	Canada, CKZN St John's NF	6160do			
2100	2200	Canada, CKZU Vancouver BC	6160do			
2100	2200	Costa Rica, R for Peace Intl	15048va	15065va	21815usb	
2100	2200	Costa Rica, University Network	15048va	15065va	21815usb	
2100	2200	Ecuador, HCJB	17660eu			
2100	2200	Egypt, Radio Cairo	15375af			
2100	2200	Eat Guinea, Radio Africa	15185af			
2100	2200	Finland, Scandv Weekend Radio	11690va	11720va		
2100	2200	Ghana, Ghana BC Corp	3366do	4915do		
2100	2200	India, All India Radio	7150au	7410eu	9650eu	9910au
			9950eu	11620au	11715au	
2100	2200	Italy, IRRS	3985va			
2100	2200	Japan, Radio	6115eu	6180eu	11830eu	11855af
			17825na	21670pa		
2100	2200	Lesotho, Radio	4800do			
2100	2200	Liberia, ELWA	4760do			
2100	2200	Liberia, R Liberia International	5100do			
2100	2200	Malawi, Malawi BC Corp	3380do			
2100	2200	Malaysia, Radio	7295do			
2100	2200	Namibia, Namibian BC Corp	3270af	3289af		
2100	2200	New Zealand, R New Zealand Int	17675pa			
2100	2200	New Zealand, ZLXA	3935do			
2100	2200	Nigeria, Radio/Enugu	6025do			
2100	2200	Nigeria, Radio/Ibadan	6050do			
2100	2200	Nigeria, Radio/Kaduna	4770do			
2100	2200	Nigeria, Radio/Lagos	3326do			
2100	2200	Palau, KHBH/Voice of Hope	9985as			
2100	2200	Papua New Guinea, NBC	4890do			
2100	2200	Russia, Voice of Russia WS	5940eu	5950eu	6045eu	7300eu
			9890eu			
2100	2200	Russia, World Beacon	7360eu			
2100	2200	S Africa, World Beacon	3230af	11640af		
2100	2200	Sierra Leone, Sierra Leone BS	3316do			
2100	2200	Solomon Islands, SIBC	5020do	9545do		
2100	2200	Sri Lanka, Sri Lanka BC Corp	4940do			
2100	2200	Syria, Radio Damascus	12085eu	13610eu		
2100	2200	UK, BBC World Service	3255af	3915as	5965as	5975pa
			6005af	6110as	6190af	9410eu
			9740pa	11835af	12095sa	15400af
2100	2200	UK, World Beacon	9675af			
2100	2200	USA, Armed Forces Radio	4278va	4319va	4993va	5765va
			6350va	6458va	10320va	10940va
			12579va	12689va	13362va	16847va
2100	2200	USA, KAIJ Dallas TX	13815va			
2100	2200	USA, KTBN Salt Lake City UT	15590na			
2100	2200	USA, KWHR Naalehu HI	17510as			
2100	2200	USA, Voice of America	6035af	6040me	6095as	7415af
			9595as	9670as	11870pa	11975af
			13710af	15185pa	15240af	15580af
			17735pa	17820as		
2100	2200	USA, WBCQ Monticello ME	7415na			
2100	2200	USA, WEWN Birmingham AL	9975na	11875na	13615na	15375na
2100	2200	USA, WHRA Greenbush ME	17650af			
2100	2200	USA, WHRI Noblesville IN	5745na	9495sa	13760na	
2100	2200	USA, WINB Red Lion PA	13570eu			
2100	2200	USA, WJCR Upton KY	7490va	13595as		
2100	2200	USA, WMLK Bethel PA	15265eu			
2100	2200	USA, WRMI Miami FL	15725am			
2100	2200	USA, WSHB Cypress Crk SC	11550eu	15665af		
2100	2200	USA, WTJC Newport NC	9370na			
2100	2200	USA, WWCR Nashville TN	7435am	9475am	12160am	13845am
2100	2200	USA, WWVF McCaysville GA	9320va	9400am	12172am	
2100	2200	USA, WYFR Okeechobee FL	7355eu	15565af	21525af	
2100	2200	Vanuatu, Radio	3945do	4960do	7260do	
2100	2200	Zambia, Christian Voice	4965do			
2100	2200	Zambia, National BC Corp	6165do	6265do		
2100	2200	Zimbabwe, Zimbabwe BC Corp	4828do	6045do		
2115	2130	UK, BBC Caribbean Report	5975ca	11675ca	15390ca	
2115	2200	Egypt, Radio Cairo	9990eu			
2120	2200	Greece, Voice of	9420au	15650au		
2130	200	UK, Wales Radio Intl/Merlin	6010eu			
2130	2145	UK, BBC Colling Falklands	11680sa			
2130	2156	China, China Radio International	5965eu	9840eu		
2130	2200	Australia, ABC/Alice Springs	4835do			
2130	2200	Australia, ABC/Katherine	5025do			

2130	2200	vi	Australia, ABC/Tennant Creek	4910do		
2130	2200		Australia, Radio	7240pa	9660pa	11880va
				21740va		12080pa
				17715va		
2130	2200	th	Belarus, R Belarus International	7105eu	7210as	
2130	2200		Guam, Adventist World Radio	11960as	11980as	
2130	2200		Iran, VOIRI	9780va	11740va	
2130	2200		Turkey, Voice of	9525eu		
2130	2200		Uzbekistan, Radio Tashkent	9540eu		

2200

2200	2210	vi	Malawi, Malawi BC Corp	3380do			
2200	2210	vi	Zambia, National BC Corp	6165do	6265do		
2200	2220	s	Greece, Voice of	9420au	15650au		
2200	2225		Italy, RAI International	9675as	11900as	15240as	
2200	2227		Iran, VOIRI	9780va	11740va		
2200	2230		Hungary, Radio Budapest	6025eu			
2200	2230		Hungary, Radio Budapest	6025eu			
2200	2230		India, All India Radio	7150au	7410eu	9650eu	9910ou
			9950eu	11620au	11715au		
2200	2230		Mexico, R. Mexico International	9705am	11770am		
2200	2230	vi	Papua New Guinea, NBC	4890do			
2200	2230		South Korea, R Korea Intl	3975eu			
2200	2230		Turkey, Voice of	9525as			
2200	2230	mtwhf	USA, Voice of America	6035af	7415af	11655af	11975af
			13710af				
2200	2245		Egypt, Radio Cairo	9990eu			
2200	2245		USA, WYFR Okeechobee FL	7580eu	11740na	15565af	21525af
2200	2256		China China Radio International	7170eu			
2200	2259		Canada, R Canada International	11705as			
2200	2300		Anguilla, Caribbean Beacon	6090am			
2200	2300	vi	Australia, ABC/Alice Springs	4835do			
2200	2300	vi	Australia, ABC/Katherine	5025do			
2200	2300	vi	Australia, ABC/Tennant Creek	4910do			
2200	2300		Australia, Radio	11715va	17795va	21740va	
2200	2300	vi	Bulgaria, Radio	7200eu	7500eu		
2200	2300		Cameroon, RTV/Yaounde	4850do			
2200	2300		Canada, CBC Northern Service	9625do			
2200	2300		Canada, CFRX Toronto ON	6070do			
2200	2300		Canada, CFVP Calgary AB	6030do			
2200	2300		Canada, CHNX Halifax, NS	6130do			
2200	2300		Canada, CKZN St John's NF	6160do			
2200	2300		Canada, CKZU Vancouver BC	6160do			
2200	2300		Costa Rica, R for Peace Intl	15048va	15065va	21815usb	
2200	2300		Costa Rica, University Network	15048va	15065va	21815usb	
2200	2300	mtwhf	Eqt Guinea, Radio Africa	15185af			
2200	2300	f/monthly	Finland, Scandv Weekend Radio	11690va	11720va		
2200	2300		Germany, Overcomer Ministries	3965eu			
2200	2300	vi	Ghana, Ghana BC Corp	3366do	4915do		
2200	2300	vi	Italy, IRRS	3985va			
2200	2300		Liberia, R Liberia International	5100do			
2200	2300		Malaysia, Radio	7295do			
2200	2300		Namibia, Namibian BC Corp	3270af	3289af		
2200	2300		New Zealand, R New Zealand Int	17675pa			
2200	2300		New Zealand, ZLXA	3935do			
2200	2300	vi	Nigeria, Radio/Enugu	6025do			
2200	2300	vi	Nigeria, Radio/Ibadan	6050do			
2200	2300	vi	Nigeria, Radio/Kaduna	4770do	6090do	7275do	9570do
2200	2300	vi	Nigeria, Radio/Lagos	3326do	4990do		
2200	2300		Palau, KHBH/Voice of Hope	9955as	9965as	9985as	
2200	2300		Sierra Leone, Sierra Leone BS	3316do			
2200	2300	vi	Solomon Islands, SIBC	5020do	9545do		
2200	2300	as	Spain, R Exterior Espana	9595af	9680eu		
2200	2300	irreg	Sri Lanka, Sri Lanka BC Corp	4940do			
2200	2300		Taiwan, R Taiwan International	5810eu	9355eu		
2200	2300		UK, BBC World Service	5965as	5975na	6175na	6195va
			7105as	9590na	9660as	11835af	11955as
			12080pa	12095sa	15400af		
2200	2300	fa	UK, Global Kitchen/Merlin	3955eu	7165eu		
2200	2300		Ukraine, R Ukraine International	5905va	9560va	11770va	
2200	2300		USA, Armed Forces Radio	4278va	4319va	4993va	5765va
			6350va	6458va	6847va	10320va	10940va
			12579va	12689va	13362va	16847va	
2200	2300		USA, KAIJ Dallas TX	13815va			
2200	2300		USA, KTBN Salt Lake City UT	15590na			
2200	2300		USA, KWHR Naalehu HI	17510as			
2200	2300		USA, Voice of America	7215as	9770as	9890as	11760as
			15185as	15290as	15305as	17735pa	17820as
2200	2300		USA, WBCQ Monticello ME	7415na			
2200	2300		USA, WEWN Birmingham AL	9975na	13615na	15375na	
2200	2300		USA, WHRA Greenbush ME	17650af			
2200	2300		USA, WHRI Noblesville IN	5745na	9495sa	13760na	
2200	2300		USA, WINB Red Lion PA	13570eu			
2200	2300		USA, WJCR Upton KY	7490va	13595as		
2200	2300		USA, WRMI Miami FL	15725am			
2200	2300		USA, WSHB Cypress Crk SC	7510eu	15285sa		
2200	2300		USA, WTJC Newport NC	9370na			
2200	2300		USA, WWCR Nashville TN	5070am	7435am	9475am	13845am
2200	2300		USA, WWVF McCaysville GA	9320va	9400am	12172am	
2200	2300	vi	Vanuatu, Radio	3945do	4960do	7260do	
2200	2300		Zambia, Christian Voice	4965do			
2230	2257		Czech Rep, Radio Prague Intl	7345na	9435af		
2230	2300		Albania, R Tirana International	7130eu	9540eu		
2230	2300		Australia, Christian Voice	13780va	15165va	17645va	21680va
2230	2300	mtwhf	Austria, R Austria International	5945eu	6155eu	13730af	
2230	2300		Belgium, Radio Vlaanderen Intl	13660am			
2230	2300		Cuba, Radio Havana	9550am			
2230	2300		Hungary, Radio Budapest	3975eu			
2230	2300	vi/as	Solomon Islands, SIBC	5020do			
2230	2300	vi/a	Solomon Islands, SIBC	9545do			
2230	2300		Sweden, Radio	6065va	7235eu		
2245	2300		India, All India Radio	9705as	9950as	11620as	13605as
2245	2300		USA, WYFR Okeechobee FL	11740na			
2245	2300		Vatican City, Vatican Radio	7305as	9600as	11830as	



SELECTED PROGRAMS

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Satellite Service Guide



All Frequencies MHz

Robert Smathers
roberts@nmia.com

Panamsat Galaxy 1R - C-Band

133 degrees West longitude

1(H) 3720	Comedy Central — West	VC2 +
2(V) 3740	Univision	Digital
3(H) 3760	STARZ/Encore	Digital
4(V) 3780	Do It Yourself Network/Food Network	Digital
5(H) 3800	Classic Arts Showcase	ITC
6(V) 3820	The National Network (TNN) — West	VC2 +
7(H) 3840	Disney Channel — West	VC2 +
8(V) 3860	Cartoon Network	VC2 +
9(H) 3880	ESPN-2 Alternate feed (occasional)	VC2 +
	Shop at Home (occasional)	ITC
	ESPN test	Digital
10(V) 3900	MSNBC	VC2 +
11(H) 3920	Eternal Word Television Network	ITC
	WEWN Worldwide Catholic Radio	5.40 (English)
		7.38 (English)
		5.58 (Spanish)
	EWTN Spanish SAP	5.80
12(V) 3940	ValueVision TV	ITC
13(H) 3960	STARZ/Encore	Digital
14(V) 3980	Shop at Home (occasional)	ITC
	ESPN Alternate feed (occasional)	VC2 +
15(H) 4000	Time Warner services	Digital
16(V) 4020	Time Warner services/Turner South	Digital
17(H) 4040	Inspirational Life Television Network	ITC
	Genesis Communications Radio Network	5.58
	WNNX-FM 106.1 Waxhaw, NC "Mix 106"	7.92
	Inspirational Life Television Network-Spanish	Digital
18(V) 4060	Home Box Office (HBO)	Digital
19(H) 4080	Cinemax — West	VC2 +
20(V) 4100	Home and Garden TV	VC2 +
21(H) 4120	USA Network — West	VC2 +
22(V) 4140	Good Life TV Network	VC2 +
23(H) 4160	Home Box Office (HBO)	Digital
24(V) 4180	Home Box Office (HBO)	Digital

GE Americom Satcom C4 - C-Band

135 degrees West longitude

1(V) 3720	American Movie Classics	VC2 +
2(H) 3740	(none)	
3(V) 3760	Nickelodeon — East	VC2 +
4(H) 3780	Lifetime — East	VC2 +
5(V) 3800	STARZ/Encore	Digital
	California Channel	Digital
6(H) 3820	History Channel — West	VC2 +
7(V) 3840	Bravo	VC2 +
8(H) 3860	(none)	
9(V) 3880	QVC Network	ITC
10(H) 3900	Home Shopping Network	ITC
11(V) 3920	Speedvision	VC2 +
12(H) 3940	tech tv	ITC
13(V) 3960	Travel Channel	VC2 +
14(H) 3980	TV Games Network	Digital
15(V) 4000	Animal Planet	VC2 +
16(H) 4020	HITS — Canales N	Digital
17(V) 4040	MTV — East	VC2 +
18(H) 4060	InDemand PPV	Digital
19(V) 4080	CSPAN-2	ITC
	CSPAN Extra	Digital
20(H) 4100	Sundance Channel	VC2 +
21(V) 4120	Discovery Channel — East	VC2 +
22(H) 4140	Flix	VC2 +
23(V) 4160	VH-1	VC2 +
24(H) 4180	Country Music TV	VC2 +

GE Americom GE-7 - C-Band

137 degrees West longitude

1(H) 3720	(none)	
2(V) 3740	KMGH-TV ABC, Denver	VC2 +
	Talk America Radio Network	7.50
3(H) 3760	C-band Central	ITC
4(V) 3780	Data Transmissions	
5(H) 3800	KDVR-TV FOX, Denver	VC2 +
	Colorado Talking Book Network	5.58
6(V) 3820	KCNC-TV CBS, Denver	VC2 +
	LDS Radio Network	5.58
7(H) 3840	FX — East	VC2 +
	Cable Radio Network	8.00
8(V) 3860	NBC	Digital
9(H) 3880	(none)	
10(V) 3900	(none)	
11(H) 3920	NHK Tokyo secondary feeds circuit	ITC
12(V) 3940	(none)	
13(H) 3960	(none)	
14(V) 3980	KUSA-TV NBC, Denver	VC2 +
	Talk Radio Network	5.80
15(H) 4000	(none)	
16(V) 4020	(none)	
17(H) 4040	(none)	
18(V) 4060	Data Transmissions	
19(H) 4080	Fox Net	VC2 +
20(V) 4100	(none)	
21(H) 4120	(none)	
22(V) 4140	(none)	
23(H) 4160	KWGN-TV WB, Denver	VC2 +
24(V) 4180	(none)	

GE Americom GE-8 - C-Band

139 degrees West longitude

1(V) 3720	Data Transmissions
2(H) 3740	Data Transmissions
3(V) 3760	Data/SCPC Services
3745.40 1404.60 55.40	Wyoming News Network/Northern Ag
	Network/Univ. of Wyoming sports
3749.40 1400.60 59.40	Learfield Communications/Univ. Indiana sports

3749.60 1400.40 59.60	Missourinet/Learfield Communications
3749.80 1400.20 59.80	Occasional Audio
3750.00 1400.00 60.00	Learfield Communications/Purdue sports
3753.40 1396.60 63.40	Kansas Info. Network/Kansas AgNet
3753.60 1396.40 63.60	Liberty Works Radio Network - talk
3753.80 1396.20 63.80	Missourinet/Univ. Illinois football
3754.10 1395.90 64.10	Western Montana Radio Network/Red
	River Farm Network /Univ. Montana sports
3754.30 1395.70 64.30	Missourinet/Kansas State sports
3763.60 1386.40 73.60	Learfield Communications/Blues hockey
3763.80 1386.20 73.80	Occasional Audio
3766.00 1384.00 76.00	Brownfield Network/Univ. Missouri sports
3766.20 1383.80 76.20	Genesis Communications Radio Network
3766.60 1383.40 76.60	Capital Radio Networks
3767.10 1382.90 77.10	MissouriNet/Learfield Communications/Univ. Illinois sports
3767.90 1382.10 77.90	Missourinet/Learfield Communications/Blues hockey
4(H) 3780	Data Transmissions
5(V) 3800	Data Transmissions
6(H) 3820	Data Transmissions
7(V) 3840	Data Transmissions
8(H) 3860	Data Transmissions
9(V) 3880	Data Transmissions
10(H) 3900	Data Transmissions
11(V) 3920	Data Transmissions
12(H) 3940	Data Transmissions
13(V) 3960	Data Transmissions
14(H) 3980	Data Transmissions
15(V) 4000	DART Audio Digital
16(H) 4020	Data Transmissions
17(V) 4040	ABC/Premiere Radio Networks Digital
18(H) 4060	Data Transmissions
19(V) 4080	DART Audio Digital
20(H) 4100	Data Transmissions
21(V) 4120	Various radio networks Digital
22(H) 4140	Data Transmissions
23(V) 4160	SEDAT Audio Digital
24(H) 4180	Alaskan Rural Communications Service Digital

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The Risky Business of Satellites

Last autumn was not the best of seasons for NOAA (National Oceanographic and Atmospheric Administration) weather satellite (WXSAT) users. The failure of NOAA-15's imaging system has been followed by a problem with NOAA-16's APT, yet to make a re-appearance. Fortunately, its AVHRR (the advanced imager) appears to be in perfect condition, and I am amongst those who have continued to receive high quality HRPT (high resolution picture telemetry).

As usual, our NOAA contact, Wayne Winston, has provided the latest information about the background work being undertaken to identify and fix the problem:

"I wouldn't even speculate whether the N-16 APT will be revived again. The fault has to be isolated, and then that component tested/cycled by ground commands, if possible. To analyze these problems remotely can be a frustrating and tedious process, but we've had a surprising number of successes with similar problems.

"There are generally no penalties for in-orbit failure. The satellite is built from subsystems supplied by many manufacturers. This is, inherently, a somewhat risky business. Penalties can be assessed for delayed delivery, or parts and components not meeting specification. Basically, one tries to address any potential problems before a satellite is launched, while there is a better chance of a suitable remedy.

"It is possible to buy commercial insurance for satellites – this is sometimes done for the launch and possible launch failure for commercial communications satellites. But it is very expensive, as it is recognized there are inherent hazards in launching and operating satellites. NOAA does not do this, as there is not a favorable cost-to-benefit ratio.

"You just try to build them to be as reliable as possible, and put in redundant systems where possible, or where failure of a system would mean failure of the entire mission. Obviously, you cannot build with duplicate 'everything' as the satellite would be too expensive and too heavy to launch. In this particular case (N-16), if the fault is found with the RF switch, it is one of those 'one-in-a-million' failures. This is a highly reliable, mechanical switch, used in the NOAA series for years without failure.

"NOAA-16 is still a success even if there are no further APT transmissions, as the APT system is not critical. All the scientific sensors are working and sending back data via the HRPT and beacon transmissions."

◆ Resurs

Resurs 01-N4 has provided some good imagery: figure 1 shows that (sun-synchronous) Resurs is activated before reaching sunlit ground. It has come from the north polar regions and is passing across a cloud-covered Britain. The image was remarkably interference-free during this pass; the noise at the end occurred at low elevation.

Resurs images have a black column on the right side of the image, inside the grey scale. On Meteor satellites (such as Meteor 3-5) this section comprises six separate columns that can be interpreted as a binary number indicating the aperture opening – the number depending on the ground illumination below.

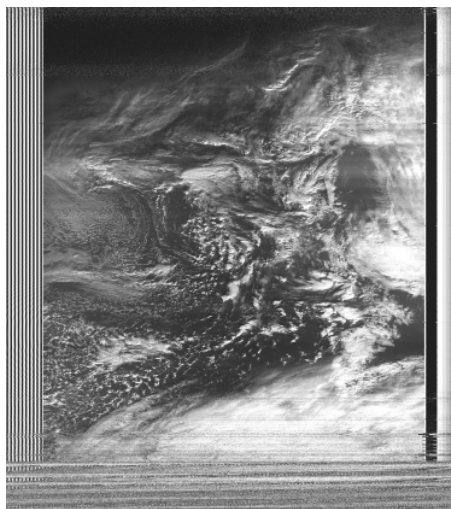


Fig 1: Resurs 01-N4 1205 UTC December 6, 2000, over UK

◆ NOAA-9 remains active

Although no longer transmitting any imagery or even house-keeping data from its beacon, reports continue to note periodic transmissions from the de-activated satellite. Dale Ireland logged transmissions on 137.50 MHz and comments, "It was transmitting a 2292 Hz tone for about 8 seconds every 45 seconds or so."

◆ NOAA-15 lives!

Tom Gwilym KA7VIK kindly sent me figure 2, a storm off the Washington coast as imaged at 1659 UTC on October 27. Tom comments that this was supposed to be the first big storm of the season, and "like most storms we get around here, the TV news media goes crazy! Live reporters on TV standing in the rain on the ocean beaches or on top of buildings, telling us to tie things down since it's going to get windy and nasty." Tom reported that the storm fizzled out, leaving a dead story.

The image was received from NOAA-15, recorded using a small QFH antenna in his attic and a R139 Hamtronics receiver. Tom's reception station can be seen on his web site: <http://www.geocities.com/tegwilym>



Fig 2: NOAA-15 1659 UTC October 27 from Tom Gwilym

Several readers have kindly sent in one or two images for the column. My apologies for not being able to show more, but my graphics allocation is limited!

Frequencies

NOAA-14 transmits APT on 137.62 MHz
 NOAA-12 transmits APT on 137.50 MHz
 NOAA-15 and 16 – see article
 Meteor 3-5 may transmit APT on 137.30 MHz when in sunlight
 Resurs 1-4 transmits APT on 137.85 MHz
 Okean-O, Okean-4 and Sich-1 sometimes transmit APT briefly on 137.40 MHz
 GOES-8 and GOES-10 use 1691 MHz for WEFAX

Weather on Your Scanner

One of the most popular topics in *Monitoring Times* is weather and reception of weather related transmissions. Just about every *MT* reader survey we have ever done shows a strong interest in listening to weather transmissions. So, in this month's *Fed File* we will take a look at two of the major radio services offered by the National Oceanic and Atmospheric Administration (NOAA) and the National Weather Service (NWS).

◆ The Voice of the National Weather Service

One of the first radio related services that new scanner listeners monitor is the NOAA Weather Radio (NWR) service in the 162 MHz band. These weather radio transmitters form a nationwide network of radio stations broadcasting continuous weather information direct from National Weather Service offices. NOAA Weather Radio broadcasts NWS warnings, watches, forecasts and other hazard information 24 hours a day.

The NOAA weather radio service has been combined with the Federal Communications Commission's (FCC) Emergency Alert System (EAS), and is now considered an "all hazards" radio network. Weather radio is the single most comprehensive source for weather and emergency information available to the public. The network now broadcasts warning and post-event information for all types of hazards – both natural (such as earthquakes and volcano activity) and technological (such as chemical releases or oil spills).

In the early days of this system, users became frustrated with the alarm portion of this service. One transmitter might cover a large area and many different counties. Listeners were forced to listen to each and every alarm carried on a particular transmitter even though it might not directly affect them.

With new digital technology called Specific Area Message Encoding (SAME), life-saving messages broadcast on NOAA Weather Radio is targeted to a specific area, like a county or portion of a state, to bring more hazard-specific information to the listening area. Additional digital technology will provide automated broadcast capability for more

timely service. Digital technology also allows these messages to be automatically received by all the communications industries of the information superhighway, broadcast, cable, satellites and other media through the Emergency Alert System.

When an NWS office broadcasts an urgent audio message (warning, watch, or non-weather emergency) it also creates and broadcasts a digital SAME code that may be heard as a very brief static burst, depending on the characteristics of the receiver. This SAME code contains the type of message, county(s) affected, and expiration time of the message.

An appropriately programmed NWR SAME receiver will then turn on for that message, with the listener hearing the 1050 Hz warning alarm tone as an attention signal, followed by the broadcast message.

At the end of the broadcast message, listeners will hear a brief digital end-of-message static burst followed by a resumption of the NWR broadcast cycle.

Known as the "Voice of the National Weather Service," the network has more than 550 transmitters, covering the 50 states, adjacent coastal waters, Puerto Rico, the U.S. Virgin Islands, and the U.S. Pacific Territories.

NOAA Weather Radio broadcasts are found in the 162-174 MHz government land mobile band on one of the following seven frequencies: 162.400, 162.425, 162.450, 162.475, 162.500, 162.525 and 162.550 MHz. You will find a complete list of stations in the network at: <http://www.nws.noaa.gov/nwr/nwrbro.htm#nwrstations>

Canadian readers also have a voice VHF weather radio service using the same frequencies as its U.S. counterpart. "Weatheradio" is a service of Environment Canada and transmitters are located all across Canada. You can find more information about this service at: http://www.msc-smc.ec.gc.ca/cd/wxradio/index_e.cfm

In this month's *Service Search* column you will find a complete list of these Canadian Weatheradio stations.

◆ EMWIN

One part of the National Weather Service mission is the need to provide the emer-

gency management community with access to NWS warnings, watches, forecasts, and other products at no recurring cost. To that end, the Emergency Managers Weather Information Network (EMWIN) system was developed. In partnership with the Federal Emergency Management Agency (FEMA) and other public and private organizations, EMWIN has now evolved into a fully operational and supported NWS service.

EMWIN is a suite of data access methods which make available a live stream of weather and other critical emergency information. Each method has unique advantages. EMWIN's present methods, in use or under development, for disseminating the basic data stream includes radio, internet and satellite transmissions.

The radio broadcast is one method used by the NWS and others for disseminating the EMWIN data stream using digital weather information transmitted using inexpensive radio broadcast and personal computer (PC) technologies.

The NWS (and other public and private agencies) transmits selected text, graphics, and imagery products as an audio signal on a dedicated VHF or UHF radio frequency. This information can be received by anyone within the 40-50 mile broadcast area, using an inexpensive radio receiver, a demodulator, and a personal computer. EMWIN software on your PC, running under Windows, receives the signal through a serial port, stores the received weather products onto disk, and simultaneously allows you to display this information.

The EMWIN data stream is intercepted from satellite by many emergency management groups, municipalities, and others, and retransmitted on local and NWS owned radio frequencies. The retransmission is, in turn, intercepted by anyone within range of the signal (generally a 40-50 mile radius from the transmitter) and displayed on their computer.

Using free retransmission software from Xenocode, Inc. at (301) 725-4009, retransmitting agencies can tailor the data to their area by eliminating products that do not apply to that area and adding locally generated data. Many retransmission sites include local road conditions, school closings, and other data

that is useful to their clients. EMWIN data stream is being disseminated via National Weather Service VHF assigned frequencies. These frequencies are specifically 163.300 MHz, 163.325 MHz, 163.350 MHz, 168.7125 MHz, and 168.8125 MHz. It is planned to propagate the 163.325 MHz frequency first.

There are other frequencies in other bands sending EMWIN data streams. Table One is the most current list of frequencies and locations on-the-air sending EMWIN data.

You can find more information about EMWIN at URL: <http://iwin.nws.noaa.gov/emwin/index.htm>

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Table One: EMWIN Radio Broadcast Areas

The *only* NWS-supported VHF broadcast is in the Norman, Oklahoma, area. The National Weather Service does not plan to implement NWS radio transmitters nationwide. All other ground-based transmitters are (and will be) the result of cooperative efforts by *other* public and private agencies, downlinking from various satellites or the Internet and rebroadcasting the data stream. Unless otherwise indicated, the broadcasts are receivable (once demodulated) as normal async 9600, N, 8, 1 or 1200, N, 8, 1.

Arkansas

Fayetteville	Unknown	148.050 MHz	1200 baud
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Florida

Seminole County	60 watts	156.105 MHz	1200 baud
St. Petersburg	100 watts	139.2125 MHz	1200 baud

Illinois

Germantown Hills	100 watts	148.6375 MHz	1200 baud
Wheaton (DuPage County)	150 watts	148.6375 MHz	1200 baud

Iowa

Des Moines	125 watts	152.180 MHz	1200 baud
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Maryland

Laurel	100 watts	142.925 MHz	2400 Baud (Xenocode, Inc)
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Notice: The Laurel, Maryland, broadcast is off the air until further notice.

Brunswick	50 watts	142.925 MHz	1200 baud
Silver Spring	300 watts	400.175 MHz	1200 baud

Notice: The Silver Spring, Maryland, broadcast is off the air until further notice.

Michigan

Battle Creek	50 watts	150.500 MHz	1200 baud
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Mississippi

Pascagoula	100 watts	148.375 MHz	1200 baud
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Missouri

Buffalo	30 watts	139.2125 MHz	1200 baud
Kansas City	300 watts	139.2125 MHz	9600 baud
Nevada	Unknown	139.2125 MHz	1200 baud

Nebraska

Wilber	45 watts	156.105 MHz	1200 baud
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North Dakota

Bismarck	40 watts	143.150 MHz	1200 baud
Grand Forks	35 watts	143.150 MHz	1200 baud

Oklahoma

Atoka	25 watts	153.950 MHz	1200 baud
Broken Arrow	25 watts	142.950 MHz	9600 baud
Clinton	35 watts	148.775 MHz	1200 baud

Durant	25 watts	150.750 MHz	1200 baud
Enid	45 watts	142.950 MHz	9600 baud
Guymon	60 watts	150.750 MHz	1200 baud
Kiamichi Mountain	75 watts	142.950 MHz	1200 baud
McAlester	100 watts	148.775 MHz	1200 baud
Miami	100 watts	150.750 MHz	1200 baud
Norman	50 watts	169.025 MHz	1200 baud
Oklahoma City	200 watts	150.750 MHz	1200 baud
Ponca City	80 watts	150.750 MHz	1200 baud
Poteau	60 watts	150.750 MHz	1200 baud
Stillwater	100 watts	148.775 MHz	1200 baud
Tulsa	650 watts	165.0125 MHz	1200 baud
Woodward	100 watts	150.750 MHz	1200 baud

South Carolina

Moncks Corner	45 watts	141.500 MHz	1200 baud
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Tennessee

Memphis	100 watts	150.750 MHz	2400 Baud
Memphis	500 watts	150.890 MHz	9600 Baud
Memphis	WYPL 89.3 FM / 67-kHz subcarrier		1200 baud

Texas

Austin	50 watts	150.435 MHz	1200 baud
Burkburnett	50 watts	150.435 MHz	1200 baud
College Station	KEOS 89.1 FM / 67-kHz subcarrier		1200 baud
Crockett	25 watts (soon 100 watts)	150.435 MHz	9600 Baud
Dallas	60 watts	150.435 MHz	1200 baud
Houston	200 watts	150.435 MHz	1200 baud
Longview	150 watts	150.435 MHz	1200 baud
McAllen (City of)	75 watts	150.435 MHz	1200 baud
Nursery	375 watts	150.435 MHz	1200 baud
Port Lavaca	100 watts	150.435 MHz	9600 baud
Temple	100 watts	150.435 MHz	1200 baud

Virginia

Atlantic	250 watts	154.515 MHz	1200 baud
Roanoke	100 watts	148.775 MHz	1200 baud

Wyoming

Cheyenne	30 watts	453.4875 MHz	1200 baud (Cheyenne)
	100 watts	141.300 MHz	1200 baud (Laramie and Albany Counties)

Seeking Frequencies

One of the first challenges facing a scanner user trying to track a trunked system is finding the right frequencies. Short of standing next to a police cruiser or fire truck with a frequency counter, how can you find the frequencies they use?

Web Resources

One of the easiest ways is to see if someone else has already figured it out, and the World Wide Web is a great place to look. A number of dedicated hobbyists maintain detailed listings of frequencies and talkgroups.

One such site is the Southeast US Trunked Radio Information Homepage run by Lindsay Blanton at <http://www.trunkedradio.net/>. The site contains specific county and city listings for Alabama, the District of Columbia, Florida, Georgia, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia. You can also find general information about Motorola and EDACS systems, decoding schematics and software, and even some tidbits about the APCO 25 standard.

In the April 2000 *Tracking the Trunks* column I reported on the Ocean City, Maryland, EDACS system. Lindsay's web site recently reported that: In coming months Ocean City, Md and Worcester County will consolidate their EDACS systems for enhanced coverage. It will be necessary to change/re-program all radios with this new talkgroup IDs and system information."

The site goes on to list the frequencies and talkgroups for the combined system.

Orange County Transportation

From the mailbag I received this question: Sir, in your November 2000 column on page 79 you found information on the Galveston County trunked system for Dale M. I have the same problem with the Orange County Transit Authority in California. I know the frequencies of 856 to 860.4875 MHz. On my Pro 90, 92, and 94 scanners Motorola Type 2 systems go right in but not this system. Any help will be a great help to me, are there any web sites on public transit that you have found? Clarence B.

The Orange County Transportation Authority (OCTA) is the primary public transportation provider in Orange County, California, with about 1,500 employees and an annual budget of more than \$500 million.

The ultimate source for frequency informa-

tion is the Federal Communications Commission (FCC), which operates a license database that can be accessed from the web. Let's walk through an example to find the assigned frequencies for the Orange County Transportation Authority.

First, go to the FCC database website at <http://gulfoss2.fcc.gov/cgi-bin/ws.exe/genmen/index.htm> and select State/County from the left side of the Table of Contents.



Select CA for the State, enter ORANGE for the County, and use YP (Trunked Public Safety/Special Emergency) for the Radio Service. Click on the "OK" button.



When the search completes, click on "ULS DATABASE" hyperlink and you should see a screen like this:



Click on the callsign assigned to the Orange County Transportation Authority, KNCM802. This should retrieve one record that looks something like this:

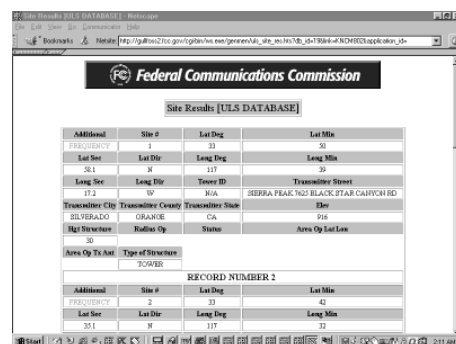


Click on "SITE" in the upper left-hand corner of the record. You'll see a set of site records.

Click on "FREQUENCY" in the upper-left hand corner of the record.

The frequency drill-down results show a total of six unique frequencies licensed at the first site (Sierra Peak): 856.4875, 857.4875, 858.4875, 859.4875, 860.4875 and 858.4125 MHz. Record number 2 (for Santiago Peak) shows the same frequencies.

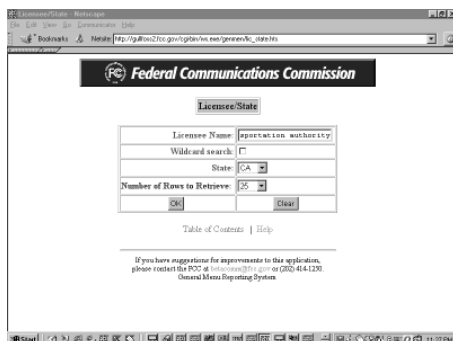
Record number 3 shows the corresponding mobile frequencies (45 MHz lower than the repeater frequencies): 811.4875, 812.4875, 813.4875, 814.4875, 815.4875, and 813.4125 MHz.



With these frequencies, Clarence can listen in conventional mode to find the control and voice channels for this trunked system.

A number of other types of FCC database searches are available from the Table of Contents. For instance, if you know the name of the licensee you're interested in, you can use the "Licensee/State" search.

Entering "orange county transportation au-



thority” results in the following table:

Licensee Name	City	State
ORANGE COUNTY TRANSPORTATION AUTHORITY (ORANGE)	ORANGE	TX
ORANGE COUNTY TRANSPORTATION AUTHORITY (ORANGE)	ORANGE	TX
ORANGE COUNTY TRANSPORTATION AUTHORITY (ORANGE)	ORANGE	TX
ORANGE COUNTY TRANSPORTATION AUTHORITY (ORANGE)	ORANGE	TX
ORANGE COUNTY TRANSPORTATION AUTHORITY (ORANGE)	ORANGE	TX
ORANGE COUNTY TRANSPORTATION AUTHORITY (ORANGE)	ORANGE	TX
ORANGE COUNTY TRANSPORTATION AUTHORITY (ORANGE)	ORANGE	TX
ORANGE COUNTY TRANSPORTATION AUTHORITY (ORANGE)	ORANGE	TX
ORANGE COUNTY TRANSPORTATION AUTHORITY (ORANGE)	ORANGE	TX
ORANGE COUNTY TRANSPORTATION AUTHORITY (ORANGE)	ORANGE	TX
ORANGE COUNTY TRANSPORTATION AUTHORITY (ORANGE)	ORANGE	TX
ORANGE COUNTY TRANSPORTATION AUTHORITY (ORANGE)	ORANGE	TX

Selecting the callsign for each entry will pull out the relevant records.

◆ Galveston, Texas

As a follow-up to Dale M.’s request in the November 2000 column, a reader who wishes to remain anonymous sent me the following talkgroup information for the Galveston County, Texas, trunked radio network. It’s a Motorola Type II system with voice channel frequencies of 866.0625, 866.1625, 866.4125, 866.4375, 866.5875, 866.8125, 866.8375, 866.9625, 867.0875, 867.3125, 867.3375, 867.5625, 867.7125, 867.8375, 868.0625, 868.2125, 868.3375, and 868.4625 MHz. Control channels are running on 868.5875, 868.6625, 868.8000, and 868.9125 MHz.

Fire

Badcliff/San Leon Fire Department	59312E7B
Bolivar/High Island Fire Department	53424D08
Dickinson Fire Department (Channel #1)	49936C31
Dickinson Fire Department (Tactical #1)	49968C33
Dickinson Fire Department (Tactical #2)	50000C35
Galveston Fire Department	52656CDB
Galveston County (Countywide Fire)	55920DA7
Galveston County (DVP Operations)	55888DA5
Hitchcock Fire Department	60720ED3
Jamaica Beach Fire Department	60848ED8
Kemah Fire Department	53680D1B
LaMarque Fire Department	53904D29
Radcliff/San Leon Fire Departments	59312E7B
Santa Fe Fire Department	54576D53
Texas City Fire Department (Channel #1)	55184D79
Texas City Fire Department (Channel #2)	55216D78
Texas City Fire Department (Channel #3)	55248D7D
Tiki Island Fire Department	61552F07

Emergency Medical Services

Galveston City	51504C93
Galveston City (Dispatch)	51472C91
Galveston County (Countywide)	55984DAB
Galveston County (Countywide)	55952DA9
Rural Metro Galveston County	54512D4F
Rural Metro Galveston County (Primary)	54480D4D
Rural Metro Galveston County (Channel #1)	54384D47
Rural Metro Galveston County (Channel #2)	54416D49

Santa Fe EMS

Police

Texas Department of Public Safety	55472D8B
Galveston County Constable (Channel A)	51120C78
Galveston County Constable (Channel B)	51152C7D
Clear Lake Shores Police	49616C1D
Dickinson Police (Channel 1)	49712C23
Dickinson Police (Channel 2)	49744C25
Dickinson Police (Channel 3)	49776C27
Dickinson Police (Channel 4)	49808C29
Dickinson Police (Channel 5)	49840C28
Dickinson Police (Special Events)	49872C2D
Galveston Police (Channel 1) Primary	52208CBF
Galveston Police (Channel 2) Information	52240CC1
Galveston Police (Channel 3)	52272CC3
Galveston Police (Channel 4)	52304CC5
Galveston Police (Channel 5)	52336CC7
Galveston Police (Channel 6)	52368CC9
Galveston Police (Channel 7 - SWAT)	52464CCF
Galveston Police (Dive Team)	52496CD1
Galveston Police (Motorcycles)	52560CD5
Galveston Police (Narcotics)	52624CD9
Gilchrist Police Department	54352D45
Hitchcock Police Department	53456D0D
Jamaica Beach Police Department	60816ED9
Kemah Police Department	53648D19
Kemah Police Department (Channel 1)	53616D17
Kemah Police Department (Channel 2)	53584D15
Kemah Police Department (Tactical)	62928F5D
LaMarque Police Department	53808D23
Santa Fe Police Department (Channel 1)	54704D5B
Santa Fe Police Department (Channel 2)	54736D5D
Texas City Police Department (Channel 1)	54896D67
Texas City Police Department (Channel 2)	54928D69
Texas City Police Department (Channel 3)	54960D68
Texas City Police Department (Channel 4)	55088D73
Galveston County Sheriff (Administration)	50832C69
Galveston County Sheriff (Beach Patrol Channel 1)	50960C71
Galveston County Sheriff (Beach Patrol Channel 2)	50992C73
Galveston County Sheriff (Beach Patrol Supervisor)	51024C75
Galveston County Sheriff (Channel 1 - Island)	50032C37
Galveston County Sheriff (Channel 2 - Mainland)	50064C39
Galveston County Sheriff (Channel 3 - Information)	50096C3B
Galveston County Sheriff (Channel 4 - Intercity)	50128C3D
Galveston County Sheriff (Communications)	50416C4F
Galveston County Sheriff (Countywide)	55888DA5
Galveston County Sheriff (Countywide Police)	55856DA3
Galveston County Sheriff (Dive Team)	50928C6F
Galveston County Sheriff (Jail)	50448C51
Galveston County Sheriff (Marine - Channel 1)	50864C68
Galveston County Sheriff (Marine - Channel 2)	50896C6D
Galveston County Sheriff (Patrol 1)	50160C3F
Galveston County Sheriff (Patrol Supervisor)	50192C41
Galveston County Sheriff (Warrants - Channel 1)	50768C65
Galveston County Sheriff (Warrants - Channel 2)	50800C67

Other

Galveston County (Countywide - All Agencies)	55952DA9
Galveston County Disaster (Channel 1)	51728CA1
Galveston County Disaster (Channel 2)	51760CA3
Dickinson Office of Emergency Measures	49904C2F
Galveston County Emergency Management (Channel 1)	51664C9D
Galveston County Emergency Management (Channel 2)	51696C9F
Galveston County Emergency Measures (Channel 1)	51888CAB
Galveston County Emergency Measures (Channel 2)	51920CAD
Galveston City Emergency Operations Center	52880CE9
Galveston School District	52944CED
Santa Fe School District	57008DEB
Texas City Independent School District	56912DE5
LaMarque Utilities	58000E29
Texas City Utilities Department	61200EF1

Our reader also recommends the website <http://www.clarc.org/~kg5ai> for further information.

◆ Scanning over the Web

If you’re interested in listening to public safety radio traffic in distant areas of the country, you may be in luck if you have a relatively fast connection to the Internet. Many cities now pipe their po-

54544D51

lice and fire dispatch frequencies to interested web surfers. Here’s a sample of some of what’s out there:

<http://www.policescanner.com> has police departments from Los Angeles, Dallas, Miami, New York and San Diego as well as the Dallas Fire Department. You’ll need either the Windows Media Player or the Real Audio Player (both are free) and at least a 28.8 kbps (kilobits per second) connection to the Internet.

Cleveland, Ohio, may be the first city to have their trunked radio traffic available on the Internet. You can check it out at <http://www.cleveland.com/policescanner>

Montgomery County, Maryland has two channels of Real Audio, Fire Ground Operations and Emergency Dispatches, available at <http://www.co.mo.md.us/mcfrs/ecc/radio.html>

Phoenix police and fire frequencies can be heard at <http://www.azcentral.com/news/scanner.html>

Cincinnati, Ohio police transmissions are available in Real Audio at <http://www.cincinow.com/mmgallery/scanner/index.shtml>

That’s all for this month. Further information and links can be found on my website at <http://www.signalharbor.com>, and I welcome your electronic mail at dan@signalharbor.com. Until next month, happy monitoring!

A Family Affair

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Something for Everyone

Welcome aboard, everyone and fasten your seatbelts. We have places to go and frequencies to examine today; let's get started!

Last year, we reviewed a book called *Five Miles and a Thousand Feet*, by Bob Tatosian, a working Air Traffic Controller from ZMP (Minneapolis ARTCC). This was the first in a series of books, each featuring 5 novelettes, concerning ATC within different ARTCCs across the country.

Mr. Tatosian's second book in the series contains stories about ZDC (Washington Center), ZMA (Miami Center), ZHU (Houston Center), ZKC (Kansas City Center), and ZAU (Chicago Center). If possible, it is even better than the first book! This is a really great "read" for anyone who is interested in ATC, whether they are also a controller, or just fascinated by the subject. The book sells for \$11.95 plus shipping and handling. Check out Bob Tatosian's website at <http://www.fivemiles.com> or write to him at P.O. Box 231, Farmington, MN 55024 for more details. You'll be glad you did – and tell him you saw it in "Plane Talk"!

◆ Flightradio.com

Here is a relatively new and very good website for us aero comms monitors. Michael Dell, N7LMJ, Webmaster and chief bottle washer, has come up with a real winner. He has areas on the website for just about every area of aero comms monitoring available today. While Michael has space available and frequencies for HF & UHF Military aero communications – and is looking for editors for those areas – his main thrust is the VHF aero communications band. Visit this really interesting website at <http://www.flightradio.com> – say you read about it in *Monitoring Times*!

◆ Airline Company Frequencies

Ted Moran of CARMA (Chicago Area Radio Monitors Association) gave us permission to use the following O'Hare airline company frequencies. He says they came to him as an anonymous contribution. Some we have published previously, but most are new to the column:

American Airlines:

129.225 - Air-ground Technisonic
129.325 - Cargo Bldg.

129.675 - Park Air Radio
129.875 - Cargo Bldg Technisonic
130.250 - Ramp
130.650 - Operations Maintenance
130.750 - Cargo Bldg
131.875 - K12 (gate)

Other airlines

128.825 - Japan Airlines
129.025 - Air France, Terminal 5
129.050 - International Terminal Tower (Ops type)
129.100 - TWA Maintenance Office
129.325 - Mexicana
129.625 - All Nippon Airways, Terminal 5
129.725 - NACA, Terminal 5
129.725 - Korean Air
129.725 - Iberia
129.725 - TAESA
129.825 - Evergreen International
129.900 - Alitalia
130.125 - Lufthansa
130.200 - Air Wisconsin
130.400 - Air Wisconsin
130.550 - DHL Air Cargo
130.700 - China Eastern Cargo
131.150 - Royal Jordanian
131.200 - Air Wisconsin
131.525 - American Trans Air (*they seem to use this freq at many locations, jib*)
131.525 - Swiss Air and Swiss Air Cargo – shared with ATA (above)
131.600 - American Eagle
131.625 - American Eagle
130.725 - TWA Operations
460.775 - Air Wisconsin (ramp rats, etc.)

San Francisco ARINC

129.350, 129.400, 129.450

Thanks, Ted!

◆ Andrews AFB

Mike Agner compiled these frequencies from many contributions for Andrews Air Force Base:

113.100 - Aircraft Info
118.400 - Control Tower //289.600
119.300 - GCA
121.800 - Ground Control
122.850 - Pilot to Dispatch
123.400 - DC Air National Guard/113th Fighter Wing Air-Air
124.000 - GCA (Washington Center)
125.350 - GCA
125.650 - Washington Class B Departure

127.550 - Clearance Delivery
128.350 - Washington Class B Approach
129.525 - 89th Airlift Wing SAM Liaison
236.600 - Tower Alternate
251.050 - ATIS
252.100 - DC Air National Guard/113th Fighter Wing Ground Support
254.250 - Washington Class B Departure
257.200 - GCA
269.000 - GCA (Washington Center)
269.500 - Washington Class B Departure
269.900 - ATIS
275.800 - Ground Control
286.600 - GCA
289.600 - Tower
292.200 - 89th Airlift Wing 'Muscle Control'
294.500 - Washington Class B Approach
301.500 - GCA
314.250 - DC Air National Guard/113th Fighter Wing 'Boxer'
316.700 - GCA
335.500 - GCA
344.600 - Base Weather (PMSV Metro)
351.200 - AFRES Dispatch ('Cody') 459th Airlift Wing
360.800 - GCA
371.800 - Dispatch
372.200 - Pilot to Dispatch
378.100 - Andrews Command Post 89th Airlift Wing SAM
379.200 - GCA
386.800 - Pilot to Dispatch
389.800 - GCA
393.100 - Clearance Delivery

◆ Out of the Routine

From our Australian Correspondent Bob Bell, who writes "On The Airbands" for *Australian Aviation* comes the following:

A BAe 146 aircraft made a taxi call, specifying the airplane as a jet.

FLIGHT SERVICE: "Alpha Bravo Charlie, copied that, no IFR traffic, are they still referring to your aircraft as a JET, are they Sir?"
BAe 146 jet: "Now, now, Perth!"

FLIGHT SERVICE: "In here, the letters 'BAe' stand for 'Bring another engine!'"

Bob says he's sure that last remark went down well with the BAe crew.

And also from Bob: Holly Hegman from the USA wrote that she was flying from Providence, Rhode Island, on board United flight UAL 1595, bound for a business conference in Seattle, Washington. She was expecting to be there well in time to have dinner and go over her notes for her speech she was to give the next day to members of the Puget Sound

Business Travel Association. She was expecting to arrive Seattle at 8:50 local, and her speech was at 1pm the next day.

As Holly puts it, "Mother Nature threw a temper tantrum" – a temper tantrum she heard all about by monitoring the inflight audio channel devoted to the aircraft's air traffic control communications, which all or most of United's domestic services have available to passengers on the inflight entertainment system. Holly thinks she is a self-confessed techno-nerd, but doesn't care what people think.

Holly was inbound to Chicago, where she was to board a connecting flight to Seattle. Severe weather began to plague ORD (O'Hare International Airport) about forty five minutes before the intended landing time, and Holly became aware that her captain was in a holding pattern. He came on the intercom and told passengers that they were in a hold due to severe weather. Holly then tuned up Channel 9 on the inflight entertainment audio, which is an air traffic control split from the aircraft main comms radio. Now, United captains can pull the pin on the inflight ATC channel at any time, but this one left it on, bless his heart, for the entire time.

Holly was particularly pleased she could get regular weather and delay updates on the ATC channel without having to wait for the fairly irregular cockpit intercom announcements to passengers. Holly's captain eventually advised ATC that he was quite low on fuel, and either Chicago O'Hare was going to have to let him make his approach, or he was going to have to consider going to an alternate (airport) immediately. ATC took their time. The captain of UAL 1595 suddenly became quite terse and blunt. He wanted an answer "now," not "later," as he had a full plane load of passengers, was now low on fuel.

He discussed diverting to Indianapolis, but, no, he was told he couldn't, as too many other aircraft had diverted there. The delays for Indianapolis were too long for him. ATC suggested St. Louis. No, sorry, UAL 159 didn't have enough fuel for St. Louis.

Suddenly, the O'Hare controller seemed to realize how critical the situation really was, and immediately took UAL 1595 out of the stack and allowed it to fly a descent and approach for immediate landing. Holly was one of the few on board perhaps who knew that if

they were again delayed for any reason, her aircraft was in a really tight spot.

But she says she preferred to know the real story, rather than the sanitized ones that passengers often get over the intercom.

Here's one more: About 11:30am one morning during the Olympic fever period, a Lockheed L-1011 Tristar operated by American Trans Air (callsign AMTRAN) arrived in Sydney with a full load of Olympic passengers on a special charter, and was scheduled to turn around some ninety minutes later for Los Angeles via Pago Pago.

The departing AMTRAN captain duly called on the radio for and received permission to "push back" and "engine start," and after being cleared to taxi, announced he would have to return to the bay (gate).

Ground: "Amtran one-zero-three-two, why?" AMT 1032: "Because we've left the crew behind!"

Thanks for these gems, Bob! That's all for this month. See you in April for more aero freqs, news, and views. Until then, 73 and out.

❖ Major World Air Routes

Here's the rest of the MWARA frequencies contributed by Ron Perron from the list started last December. Keep in mind that not all of the frequencies listed are in use at any one time; some are rarely used at all:

EUR-A (EUR-Europe)

2910	4689	8826	10084
3411	5519	8875	11390
4672	5661	9024	

INO-1 (INO-Indian Ocean)

2872	5517	6586	8909	13306
2878	5601	6655	8948	
3467	5634	8870	10018	
3476	5658	8873	11300	
5493	6559	8879	13288	

MID-1 (MID-Mid East)

2992	5658	7595	10018
3404	5667	8091	13288
5100	5856	8847	13306
5603	6925	8918	17961

MID-2

2872	5580	6583	8906	13288
2923	5601	6624	8918	13312
2992	5658	6925	8948	13336
3312	5667	8091	10009	
3446	5856	8861	10018	
3467	6556	8879	10066	

MID-3

2926	4095	4728	8145	10018
3440	4669	5487	8918	11333
3467	4672	5586	8951	11390
3476	4712	5658	9955	

AFI-1 (AFI-Africa)

3452	6535	8861	13294	17955
5554	6638	8882	13315	
5565	6673	11291	13357	

AFI-2

3411	5519	8826	13304	13294
3419	5652	8894	13273	

AFI-3

2872	5658	8879	8948	13306
3467	6559	8888	10018	13336
5517	6574	8903	11300	17961
5601	6655	8909	13288	
5634	8870	8913	13294	

AFI-4

2851	5565	8873	13273	21926
2878	6559	8879	13294	
3411	6586	8888	13304	
5493	8826	8903	13315	
5519	8861	10018	17955	

NAT-A (NAT-North Atlantic)

2887	5440	6628	10096	13306
2910	5526	6730.5	11291	17946
2962	5540	8825	11309	
3016	5598	8855	11387	
3023	6577	8906	13297	

NAT-B

2899	5616	8864	11279	13291
17946				

NAT-C

2872	5649	8879	11336	13306
17946				

NAT-D

2971	4675	8891	11279	13291
17946				

NAT-E

2962	6628	8825	11309	13354
17946				

NAT-F

3476	6622	8831	13291	17946
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Station Identification

Broadcast DXers are, of course, fond of hearing distant stations. Many of us are fans of radio in general. If we see a broadcast tower, we won't rest until we know whose it is!

Telling the difference between an AM station and an FM or TV station tower is relatively simple. At AM stations, the tower is the antenna. The entire tower is responsible for radiating signals. If you see a tower with nothing on it, it's almost certainly AM. See the center photo; this is WKIN-1320 Kingsport, Tennessee.

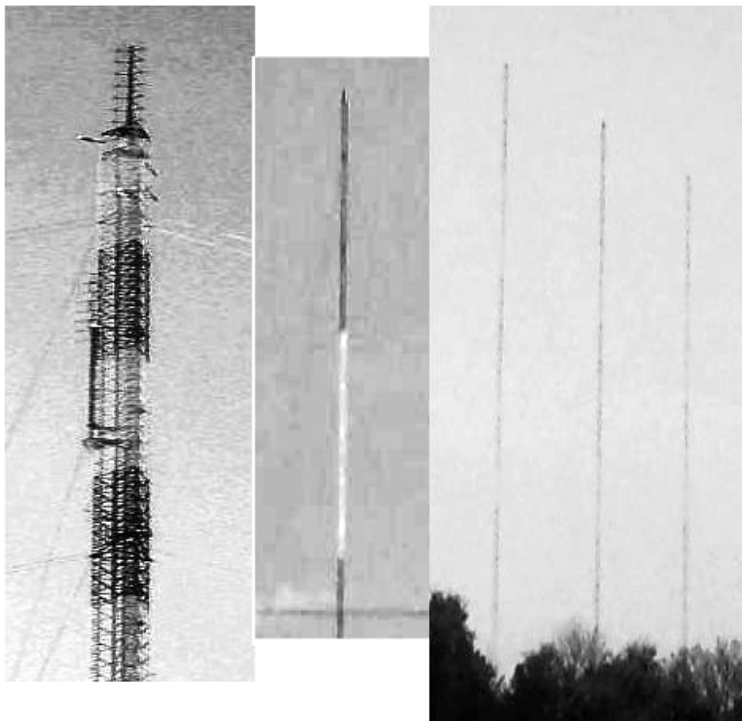
Small antennas partway down the tower (not on top) are occasionally seen; these are usually studio-transmitter links, or antennas for internal two-way communications. A large antenna at or near the top isn't necessarily a sign that a station isn't AM, though. Smaller FM stations often share the towers of an AM station.

Another dead giveaway of an AM tower are insulators in the supporting guy wires. Using single pieces of wire to support the tower is less expensive and less likely to fail, but it also "grounds out" the tower, making it much less effective as an antenna. AM stations "break up" the guy wires by inserting ceramic or glass insulators at regular intervals. If a tower's guy wires have lots of little "bulges" (as viewed at a distance), it's AM.

A single AM tower radiates equally well in all directions. To avoid interference, many AM stations are required to radiate less signal in the direction of older stations. This is done by erecting multiple towers. (Basically, the station intentionally interferes with itself!) Several similar towers at the same site and evenly-spaced are a clear sign of a directional AM station. Towers at a directional station aren't necessarily identical; don't rule out a directional AM site just because the towers are different. The right-hand photo is of WCTZ-1550 Clarksville,

Tennessee, which is directional at night.

FM and TV stations are different. Most of the tower does not radiate signals; it exists only to hold the radiating antenna as high in the air as possible. FM and TV towers will have large antennas either protruding from the top or hanging from the sides. Or both; it is not unusual for a single tower to host more than one station. The actual transmitting antennas may be 100 feet tall, though it's usually hard to tell because the antennas are so high in the air!



FM and TV towers are also often substantially taller than AM towers. FM/TV towers of 1,000 ft. in height are not unusual, while AM towers taller than 300 ft. are rare. Because the tower itself doesn't radiate signals, the guy wires in a FM/TV tower are not insulated; you'll see single wires going all the way to the ground. The first photo shows the WSMV-TV tower in Nashville; you can also see the WZTV-TV antenna hanging off the side. Four FM stations also share this tower.

◆ Expanded-band news

Two brief items this month. While looking at TV items, I discovered that KALT-1610 Atlanta, Texas, has applied for an operating license. The station has been testing, and expected to begin their regular talk format shortly after Thanksgiving. Here's hoping you can hear it through the mess of travelers' information stations on that frequency!

The other new one is north of the border. Canada's first expanded-band station, CHEV-1630 Toronto, hasn't seen much activity. Now, a second station is planned, also on 1630. This one will also use 99 watts, and will be a travelers' information outlet at the Ottawa airport.

◆ Bits & Pieces

Bryan Turner, W8LN of Athens, Alabama (and several others) have noted WSM-650 is no longer stereo. Bryan contacted the station and was told they are going to experiment with IBOC digital. Stereo is permanently gone from WSM. Bryan also mentions <http://www.egroups.com/group/amstereo>, a mailing list about AM stereo.

Would you like to try DXing FM in Europe? I'm sure a lot of us would, but our spouses would never let us drag a radio along! Now, you can do it without actually travelling. Kelly Lindman SM0NHC has put an Icom PCR100 online in Malmo, Sweden. The receiver is connected to four stacked 8-element FM Yagis. (That's one serious antenna system!) Check out <http://www.javaradio.com>, which also has links to other Internet-controllable receivers in other parts of the world.

What's making it to *your* antenna? Let us know. Write: w9wi@w9wi.com or Box 98, Brasstown NC 28902-0098. Note the change in e-mail address; the Bellsouth.net address was receiving too much spam. It will still work for another few months though. Good DX!

Variety and Quantity Return

We have so many different pirate loggings this month that we have to jump right into the broadcast news sent in by *MT* readers.

◆ Condolences

Monitoring Times sends its sincere sympathy to John T. Arthur, whose mother passed away shortly after Thanksgiving. John, the interim publisher of *The ACE*, is a longtime major force in the pirate radio scene. His mother was a longtime ACE member, and a strong supporter of our hobby.

◆ What We Are Hearing

The new year is off to a good start in pirate radio. *MT* readers logged over two dozen North American shortwave pirate stations, all on 6950 or 6955 kHz. Your best bet is to tune these frequencies on weekends, two to four hours before or after local sunset.

Eat It Radio- Oldies rock music and pirate radio advocacy, a common format, holds forth here. (None)

Fight for Free Radio- So far the main purpose of this station has been to create fights within free radio through complaints about the Free Radio Network web site. (None, accepts reports on the Free Radio Network web site; go figure)

Ground Zero Radio- Lately they have mixed seasonal music with their rock programming. (Blue Ridge Summit and Elkhorn)

Indira Calling- Vijay Nehru's All India Radio parody station features "sitar" music by the Beach Boys. Don't be fooled by the announced Calcutta address. (Providence)

Jean Chretien Station- The Canadian election stimulated this operation, but surprisingly there were almost no pirates or clandestines who targeted the lengthy disputes in the United States election. (None)

NOEL- From the call letters, it is obvious that this one features holiday music. But, Santa apparently is not delivering QSLs down the chimney. (None)

Old Turkey Radio- Their comedy about American eating habits at Thanksgiving is a good example of a seasonal holiday station. (uses oldturkeyradio@hotmail.com e-mail)

Radio Azteca- Bram Stoker still comes up with hilarious original comedy bits about DXers and DXing. He's produced about 40 of these content-packed broadcasts. (Belfast)

Radio Bingo- The bingo game on shortwave radio still pops up occasionally. It's more rigged than a chad-filled election, since John T. Arthur

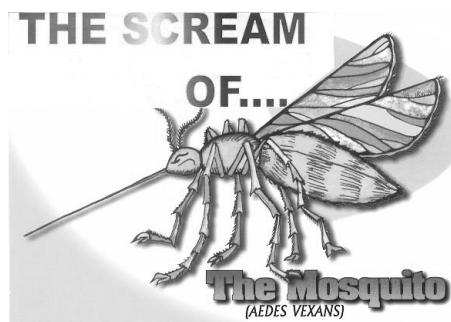
wins every time. (now uses radiobingo@chek.com)

Radio Free Speech- Bill O. Rights is back, sometimes with a very powerful AM transmitter. His advocacy for individual freedom is now supplemented by relays of other pirates. (Belfast)

Radio Neptune- Their "universal service," hosted by Joe Mack, formerly was heard only in Europe. (Blue Ridge Summit)

RBCN- Radio Bob retains a prominent position in pirate radio with his down-home southern style, including interviews with Colonel Hounddog. (Lula)

Scream of the Mosquito- As we see here this month, Ben Loveless got a fine QSL for a bulletin logging. (None, verifies logs in *The ACE*)



Sycko Radio- Their fare has evolved into a mix of rock music and drama programming. (None)

URGZ- The elaborate programming about human instincts on this classic pirate station has returned lately. They used to QSL, but no current address is known. (None)

Voice of Bizarro World- Xhem's classic backwards parody station resurfaced last month after a long absence. The station begins with a sign-off, but closes with a sign-on. (Huntsville)

Voice of Captain Ron Shortwave- Captain Ron is now mixing his rock music with commentary on the pirate radio scene. (uses captainronsw@yahoo.com)

Voice of the Runaway Maharishi- The Maharishi Hashishi Ganja produces lengthy commercials for drug use, in a pretty clever fashion. (Providence)

Voice of Shortwave Radio- Their ancient rock oldies are a backdrop for comedy and novelty bits. (Blue Ridge Summit)

WHYP- James Brownyard claims to be the most underrated pirate on the air today, and he may be right. (uses whyp1530@yahoo.com e-mail)

WLIQ- This one often surfaces around holidays with seasonal music from Lake Superior. (None)

WLS- The old top 40 rock format from Chicago on WLS has spawned a number of pirate memorials over the years. (None)

WMFQ- No shortwave station, pirate or otherwise, has ever done more to promote QSLing than this one. Lately they have criticized other stations who do not verify reports. (Providence)

WPAT- This new one has had some equipment problems, but when it's heard, novelty music predominates. (None)

WPN- The World Parody Network has returned after a long layoff. Miscellaneous comedy is their stock in trade. (Huntsville)

Z-100- A brand new operation, this one is distinctive as a clone of a commercial FM rock oldies station. (uses bigz100fm@yahoo.com)

◆ Reports and QSLs

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations. This finances postage for a souvenir QSL to your mailbox. Your letters go to these addresses: PO Box 1, Belfast, NY 14711; PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 69, Elkhorn, NE; 68022; PO Box 24, Lula, GA 30554; and PO Box 11522, Huntsville, AL 35814. A few pirates, as listed, prefer e-mail, bulletin logs or internet web site reports instead. Reports to the **Free Radio Network** go to <http://www.frn.net/> on the web. *Free Radio Weekly* loggings go via niel@ican.net e-mail. Sample copies of *The ACE* are \$2 via the Belfast maildrop.

◆ Thanks

Your input is extremely welcome via PO Box 98, Brasstown, NC 28902, or via my e-mail address atop the column. This month we heard from John T. Arthur, Belfast, NY; Cachito, Santiago, Chile; Ross Comeau, Andover, MA; Tim Cooper, UK; Rich D'Angelo, Wyomissing, PA; Joe Filipkowski, Providence, RI; Harold Frodge, Midland, MI; Captain Ganja, Belfast, NY; William T. Hassig, Mt. Prospect, IL; Hans Johnson, AZ; Jim Keeling, St. Charles, MO; Chris Lobdell, Stoneham, MA; Ben Loveless, Bloomfield, MI; Greg Majewski, Oakdale, CT; Bill McClintock, Minneapolis, MN; Cachito Marnani, Santiago, Chile; Adrian Peterson, Indianapolis, IN; Mike Prindle, New Suffolk, NY; Lee Reynolds, Lempster, NH; Martin Schoech, Merseburg, Germany; Doug Smith, Pleasant View, TN; Bud Stacey, Setsuma, AL; DJ Stevie, Basel, Switzerland; Mike Striatus, CT; Gary Thorburn, Boston, MA; Niel Wolfish, Toronto, Ontario; and Andrew Yoder, Blue Ridge Summit, PA.

The Band is Hot!

Although slow in getting started, I'm happy to report that longwave conditions this winter seem to be doing extremely well. This is evidenced by a long list of loggings this month from three contributors—plus a few of my own thrown in for good measure (see Table 1).

I am happy to welcome Dave Tomasko as a contributor this month. He submitted a fine list of logs from his location near Chicago, IL. Dave has gained notoriety in LF circles for his knack of identifying “difficult” beacons for listeners on many occasions. If you've heard a beacon that you can't find listed in beacon guides, past loggings, on the Internet, etc., you can contact Dave at Kdtomasko@aol.com for expert assistance.

Jim Renfrew of Byron, NY, also checks in with an impressive list of logs this month. He uses a Drake R8 with a 500-ft (152 meter) wire antenna oriented in an East/West direction. Some of Jim's loggings are from a DXpedition he took to Cappahayden, NF, back in October 2000.

Finally, we have a nice selection of intercepts from Jacques d'Avignon, many of which were heard while attending a DXpedition at Brantingham, NY, just south of his home location near Ottawa, Ontario. Jacques used an AOR AR-7030 receiver and a Wellbrook ALA 1530 large aperture loop for his loggings.

Web Updates

Alex Wiecek's longwave site has changed its URL to <http://members.home.com/wiecek6010>. Alex (VE3GOP) runs this site from his location in Ontario, Canada. It features pictures of beacons and antennas, Canadian beacon listings, sound clips and LW DXing news. The site also contains an interesting story by Dave Tomasko (see above) about how beacons get their names. This is clearly one of the most interesting longwave sites on the web right now. Got a favorite LW site that you'd like to see plugged in *MT*? Just send the details to me at lowband@gateway.net.

Alan Gale (<http://www.alan.gale.clara.net/beaconworld.htm>) sends a special QSL from historical station SAQ, 17.2 kHz in Grimeton, Sweden. The QSL (Figure 1) was issued for SAQ's commemorative

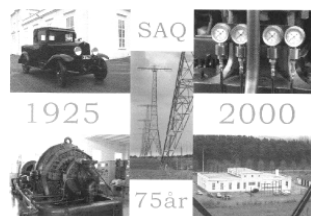


Figure 1. QSL card from station SAQ (17.2 kHz), Grimeton, Sweden (Courtesy of Alan Gale—UK).

broadcast of July 2, 2000. This station has been on the air since 1924 and uses one of the last remaining Alexanderson Alternator transmitters. The Alternator is a mechan-

TABLE 1. SELECTED LF LOGGINGS						
FREQ	ID	LOCATION	BY			
153	—	Bechar, Algeria*	J.R. (NY)	364	TZ	Winchester, VA
162	—	Allouis, France*	J.R./K.C. (NY)	365	PBC	Columbia, TN
183	—	Saarouis, Germany*	J.R. (NY)	369	CXU	Camilla, GA
189	—	Iceland*	K.C. (NY)*	382	POS	Port of Spain, TTO
198	—	BBC-Droitwich, ENG*	J.R. (NY)	382	LQ	Boston, MA
203	T	Thompson, MB	D.T. (IL)	391	DDP	San Juan, PR
204	YFY	Iqaluit, NT	D.T. (IL)	395	XEN	Xenia, OH
205	YRQ	Trois Rivières, QC	D.T. (IL)	395	SL	Saranac Lake, NY
206	GLS	Galveston, TX	J.R. (NY)	400	PIE	Piedecuesta, COL
208	YSK	Sanikiluaq, NT	J.R., K.C. (NY), J.D. (ON)	400	CI	Sioux St. Marie, MI
209	GDW	Gladwyn, MI	J.D. (ON)	402	C	Camaguay, Cuba
213	YRC	St. Honoré, QC	D.T. (IL)	404	ZR	Sarnia, ON
214	K8	Nemiscou, QC	D.T. (IL)	404	IUB	Baltimore, MD
216	ME	Matane, QC	D.T. (IL)	407	AQ	Appleton, WI
221	DYO	Rutland, VT	J.D. (ON)	410	EGQ	Emmetsburg, IA
224	VWD	West Dover, VT	J.D. (ON)	411	VFU	Van Wert, OH
239	TCU	Tecumseh, MI	J.R. (NY)	412	CMY	Sparta, WI
242	EFK	Newport, VT	J.D. (ON)	414	IEB	Lebanon, MO
251	ZQA	Nassau, QC	D.T. (IL)	414	JUE	Lebanon, TN
263	BGF	Winchester, TN	D.T. (IL)	417	IY	Charles City, IA
263	DEQ	Greenville, TN	D.T. (IL)	417	EK	Worcester, MA
266	BR	Atlanta, GA	J.D. (ON)	418	HHG	Huntington, IN
269	OSX	Kosciusko, MS	D.T. (IL)	419	RYS	Detroit, MI
270	SAL	Cape Verde Islands	J.R. (NY) †	420	CEK	Crete, NE
278	ADG	Adrian, MI	J.R. (NY)	423	CKP	Cherokee, IA
281	HXX	Berlin, NH	J.D. (ON)	423	DXE	Dexter, MO
290	TVK	Centerville, IA	J.R. (NY)	426	EN	Omaha, NE
305	YQ	Churchill, MB	J.R. (NY)	426	FTP	Fort Payne, AL
327	POR	Porto, Portugal	J.R. (NY)†	429	IKY	Springville, KY
329	YEK	Eskimo Point, NT	J.R. (NY)	430	AYB	Auburn, NE
332	PH	Port Huron, MI	J.R. (NY)	434	SLB	Unidentified
333	HQU	Thomson, GA	D.T. (IL)	450	PPA	Puerto Plata, Dom. R.
335	RWN	Winamac, IN	J.R. (NY)	509	OF	Unidentified
335	PST	Madeira, Porto Santo	J.R. (NY) †	512	SSB	Unidentified
338	DE	Detroit, MI	J.R. (NY)	515	RRQ	Rock Rapids, IA
347	ANQ	Angola, IN	J.R. (NY)	518	BHZ	Belo Horizonte, Brasil
353	HOT	Higuerote, VEN.	J.R., K.C. (NY)	518	GCT	Guthrie Center, IA
356	PB	W. Palm Beach, FL	K.C. (NY)	521	TVX	Greencastle, IN
359	TPX	Texapexon, MEX	D.T. (IL)	526	ZLS	Stella Maris, BAH
362	OX	Oxford, CT	J.D. (ON)	1610	OXZ	Denmark
362	LYL	Lima, OH	J.D. (ON)			

* LW broadcast station

† Heard at Newfoundland DXpedition

cally-driven device that spins fast enough to generate low frequency RF energy directly. You can learn more about SAQ at: <http://www.telemuseum.se/Grimeton/>.

New LF Catalog

Some of you may recall the Q-Stick antenna that was popular a few years ago among LF DXers using portable receivers. This tuned, passive antenna produced greatly improved signal strengths when placed atop a portable receiver. I still use one today with a Sony 2010.

After a long hiatus with no announcements, Gerry Thomas (KB4JFM), proprietor of RadioPlus+ Electronics, has recently released a new catalog of LW/MW DXing tools. His lineup includes the venerable Q-Stick, the Quantum Loop QX, the QX Pro and other antennas which are designed for high per-

formance desktop reception.

He's considering the launch of a web site (pending evaluation of his production capabilities), but you can request a no-frills catalog right away by e-mailing Gerry at radioplus@pcola.gulf.net. The catalog I received contained six pages of products along with photos of several key items. The catalog is available as a Word file, or in a basic .TXT format.

End Notes

February is an excellent time to try for experimental “Lowfers” operating at 160-190 kHz. CW is the traditional mode for Lowfer operation, but you are likely to hear some data signals on the band as well. If you are in the Northeast, you may want to try for my beacon, “KC” operating at 185.000 kHz. For more information on Lowfers, check out the LWCA web site at <http://www.lwca.org>.

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500 Channels • 10 banks • CTCSS/DCS • S Meter
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Due to the high demand for this new product, allow 30-60 days for delivery.

The Bearcat 780XLT has 500 channels and the widest frequency coverage of any Bearcat scanner ever. Packed with features such as Trunktracker III to cover EDACS, Motorola and EF Johnson systems, control channel only mode to allow you to automatically trunk certain systems by simply programming the control channel, S.A.M.E. weather alert, full-frequency display & backlit controls, built-in CTCSS/DCS to assign analog and digital subaudible tone codes to a specific frequency in memory, PC Control with RS232 port, Beep Alert, Record function, VFO control, menu-driven design, total channel control and much more. Our CEI package deal includes telescopic antenna, AC adapter, cigarette lighter cord, DC cord, mobile mounting bracket with screws, owner's manual, trunking frequency guide and one-year limited Uniden factory warranty. For maximum scanning enjoyment, order magnetic mount antenna part number ANTMMBNC for \$29.95; The BC780XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. For fastest delivery, order on-line at www.usascan.com

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SCANNERS

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10 Priority Channels • Programmed Service Search**
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Bearcat 248CLT 50 ch. base AM/FM/weather alert scanner.....	\$89.95
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Bearcat 80XLT 50 channel handheld scanner.....	\$99.95
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Books to Grow By

Whenever I teach a new ham class, I am always pleased to find that a number of the students express a real desire to go beyond simply passing the test and getting on the air. More than a few folks seek resources that will allow them to get a better understanding of the electronics of amateur radio. Likewise, I often get letters and e-mail on the very same subject.

There are a number of excellent books that can go a long way in improving upon the basic knowledge licensing tests expect. As a service to those who are looking to expand their horizons, allow Old Uncle Skip to share with you an annotated bibliography of the books that can help you out. This book list also has a great deal to offer the advanced ham.

THE ARRL HANDBOOK FOR RADIO AMATEURS 2001

78th Edition

Editor: Chuck Hutchinson K8CH et al

1216 Pages

\$32 Paperback, \$49.95 hardbound,

\$39.95 CD ROM version

ISBN 0-87259-186-7

The American Radio Relay League

225 Main Street

Newington, CT 06111

1 (888) 277-5289

<http://www.arrl.org/>

Let me tell you a little story. Many years ago when I first became interested in amateur radio, I went to my local library and looked at a copy of the then current edition of "*The Handbook*." (I won't tell you exactly how long ago that was, but I will say that there were a heck of a lot more vacuum tubes in the circuits back then.) I could barely understand the table of contents much less all of the information in the following pages.

Well, as is my nature, I kept at it. Over the years, in each successive edition, I grew to understand more and more. Now I feel I can turn to any page and get a quick handle on the topic that is troubling my mind. This ongoing growth of understanding is really what ham radio is all about. *The Handbook* is the single volume that has historically done this best. For most of us with a number of years under our belts, *The Handbook* is a companion and friend.

The *Handbook* has taken different approaches to presenting its information over the years. This latest edition starts with a basic in-

troduction to the amateur radio experience. This is followed by a series of chapters on fundamental electronic theory. These particular chapters are most in keeping with the theme of this article. You could easily use these chapters on Mathematics, DC and AC Theory, as well as Digital and Analog Theory, as the best path to move a bit beyond the basics that were needed to pass your first license exam. Further, the information would serve well as a guide to the theory portions of the more advanced amateur tests.

The next section of the book is probably the most popular – Practical Design and Projects. This is where you move beyond the theory and get a few things built and on the air. Designs for stages of receivers, transmitters, powers supplies and antennas serve to get the reader to try things out and make improvements on their existing station. This is the essence of the amateur radio art. If you're a bit afraid of rolling up your sleeves, the following section on Construction Techniques will show you how it's done.

The book finishes up with a comprehensive guide to Operating Practices, including extensive reference material.

For the last few years, the ARRL has begun to also offer *The Handbook* in CD ROM format. This version is particularly useful over the more traditional bound version in that it allows the user to conduct searches for specific material. The CD version also includes a number of programs to aid in such things as filter design and transmission line analysis.

So as far as Old Uncle Skip is concerned, this is the first radio electronics book you need and for many it will also be the last. Its depth of practical knowledge is that great!

UNDERSTANDING BASIC ELECTRONICS

BY Larry D. Wolfgang WR1B

314 pages

\$20.00

ISBN 0-87259-398-3

The American Radio Relay League

This is a book that has been needed by the hobby for a long time. *Understanding Basic Electronics* is a great starting point for anyone who has little or no knowledge of radio electronics. It gives clear and concise explanations of the main electronics concepts behind

everything we do when we participate in amateur radio. Most importantly, if you were like me and didn't pay close attention in math classes, it provides a complete guide through all the basic mathematics needed to really move on in discovering advanced electronics concepts.

The book is laid out very much like a good text book. It has four units covering mathematics, DC electronics, AC electronics, and a catch-all unit covering semiconductors, integrated circuits and vacuum tubes. Further, the book has an appendix and glossary providing support to the main units.

Each chapter covers a main concept, usually by providing a number of "real world" analogies to help lock down the main idea. Most chapters also provide an opportunity to test what has been learned, usually by working through the associated mathematics but the reader can also conduct a few simple practical experiments using common devices.

THE ELECTRONICS OF RADIO

by David B. Rutledge KN6EK

431 pages

\$44.95 paperback, \$100.00 Hardbound

ISBN 0-521-64136-5

Cambridge University Press

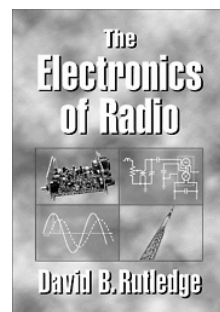
New York, NY

<http://www.cup.org>

Mr. Rutledge's book has been causing quite a stir in the amateur radio community. He is a professor of Electrical Engineering at the California Institute of Technology. The technique he chose to use in his book is to walk the reader through a complete study of basic radio design by encouraging the reader to build a popular CW transceiver kit, the NorCal 40A, currently available from Wilderness Radio <http://www.fix.net/jparker/wild.html> Once

you've worked your way through the book you would then not only have a fine working radio but a great deal of knowledge and information about how it works. What a great idea for both a text book and a course of self-study!

Rutledge begins with a great basic



study of electronic components. From there essentially the reader works his or her way through the stages of the NorCal 40A, looking at oscillators, mixers, filters, amplifiers and how these stages come together to produce a useful transceiver. One of the things I really appreciated in this book was its examination of audio circuits and acoustics. Many books give these topics short shrift in favor of the RF design aspects. However, once you've heard CW through a tuned speaker, you'll never go back to anything else.

Let me remind you that this book was written as a practical college text and as such the math can get a bit hefty. This should not discourage the reader because in between the advanced mathematics is a great deal of useful information that can be grasped by any radio amateur.

The book also includes a disk containing the program PUFF, a basic circuit simulator that has many uses, but, in the scope of this book, concentrates on filter and transformer analysis.

PRACTICAL RF DESIGN MANUAL

by Doug DeMaw W1FB

246 pages

\$19.95

MFJ Publishing

Starkville, MS 39759

ISBN # 1-891237-00-4

<http://mfjenterprises.com>

Most of us came to know Doug's work through his articles in *QST* and *Monitoring Times*. This book shows a bit more of Doug's scholarly side. It gives the reader a one stop study of basic radio design. Making extensive use of practical circuits (many of which can be built right out of the book) Doug led the reader through Transmitter and Receiver Fundamentals including detailed analysis of Mixers, Balanced Modulators, Detectors, IF Amplifiers, Filters, AGC Systems, Frequency-Control Systems, Small and Large Signal RF Amplifiers, and Frequency Multipliers.

Anyone familiar with some of Doug's *QST* transmitter or receiver designs will see the fundamentals in the circuits shown in this book. You can quite literally read each section and build the circuit as a way of furthering your understanding. Doug had a way of making even the most complex topics easy to understand. Over the years I've learned a great deal from his writings and this book taught me even more. I hope that it does the same for every reader.

SOLID STATE DESIGN FOR THE RADIO AMATEUR

By Wes Hayward W7ZOI & Doug DeMaw W1FB

256 pages

\$15.00

ISBN 0-87259-040-2

The American Radio Relay League

Since its publication, *Solid State Design for the Radio Amateur* has sold well over

50,000 copies, and for good reason. Wes Hayward and the late Doug DeMaw created one of the greatest single volumes on the subject of basic radio theory ever printed. This book is written for the person with more than a passing interest in what is going on behind the dials of their receiver or transmitter. You can quite literally take this book and construct any number of receiver or transmitter circuits and accessories. But, far beyond any basic construction project book that may give the reader a few lines about how the circuit works, Wes and Doug teach you the theory and then take you through the circuit to illustrate the various topics they cover.

One of the great secrets that Hayward and DeMaw share with the reader is that it is very possible to build receiver and transmitter circuits that can rival and even outperform much of the commercial gear on the market. Even if melting solder is not your cup of tea, reading this book and studying the circuits will allow you to make much more informed decisions when you go shopping for radio equipment.

The book begins with a study of general semiconductor theory as it relates to RF design. This is followed by chapters covering transmitters, amplifiers and matching networks, receivers, and modulation methods. Also included are sections on test equipment and accessories. The more advanced mathematical theories are covered in detail in the appendices. This is truly a book that belongs on every serious radio hobbyist's shelf.

INTRODUCTION TO RADIO FREQUENCY DESIGN

by Wes Hayward W7ZOI

383 pages + software disk

\$30

ISBN: 0-87259-492-0

The American Radio Relay League

Let me warn you in advance that *Introduction to Radio Frequency Design* assumes that the reader knows a bit more than Ohm's Law. It was originally published as a supplemental text for working engineers. Still, a dedicated hobbyist with a solid foundation in basic electronics can muddle through and gain a lot of knowledge about RF concepts.

The text covers, in detail, eight major aspects of radio theory and practice including: Low Frequency Transistor Models, Filter Basics, Coupled Resonator Filters, Transmission Lines, Two Port Networks, Practical Amplifiers and Mixers, Oscillators and Frequency Synthesizers and the Receiver: AM RF System. The book makes use of illustrations and extended mathematical analysis to fully examine each concept. "Real world" circuits are used to demonstrate the applications discussed, many of which can actually be pressed into service should you desire to take up a soldering iron.

The book includes a disk of useful programs to aid the reader with testing the various design concepts discussed in the book including programs covering filter design, feedback

amplifiers, RF system dynamic range and phase-locked loops.

If you are ready to design the next great receiver, this book will put you on the right track.

So, as you can see, armed with a couple of good books, it is possible to begin to advance your understanding of how this whole radio thing works. Have fun. Learning something new is the greatest thrill I know.

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Rehabbing an R.F. Generator

In last month's column, we successfully tested the little Philco *Transitone* a.c.-d.c. set that we'd been working on for a few issues. Normally, after a receiver comes back to life on the workbench, my next step is to check its alignment. Quite often, a dramatic increase in performance can be realized by tweaking alignment adjustments – particularly the i.f. transformer trimmers. However, part of my mission in this column is to help newcomers to the restoration hobby get a good start. So I'll postpone the alignment, and instead discuss the acquisition and rehabbing of that essential alignment instrument: the r.f. signal generator.

♦ Characteristics of an R.F. Generator

What is an r.f. signal generator? Well, not surprisingly, the purpose of this instrument is to generate a radio signal for use in adjusting radio receivers. Why do you need a special generator when there are always plenty of radio stations broadcasting signals? There are several good reasons.

Not to put too fine a point on it right now, the radio serviceman requires a stable signal he can adjust to specific frequencies and to specific signal strengths. Radio stations, of course, have fixed frequencies and strengths. Not only that, but the frequency of the a.m. superheterodyne's i.f. (intermediate frequency) amplifier, a "must-do" adjustment, is well below the frequency of any radio station in the broadcast band.

The r.f. generators intended as radio test instruments are equipped to cover i.f. frequencies as well as standard and shortwave broadcast frequencies. They are continuously adjustable over the entire frequency range and are generally equipped to modulate the signal with an audio tone if desired. Controls

are provided to attenuate (reduce) the signal output to the desired level. Well-designed, high-quality instruments offer a stable signal, a well-calibrated vernier tuning dial, and a wide tuning range divided into several bands.

You'll most likely be acquiring a used signal generator at a hamfest or a radio flea market. As you can imagine, signal generators for radio service aren't made new anymore! Some models (particularly higher-end industrial or military units) are available through surplus sources, and you will find these by browsing through magazine ads and the internet.

♦ What to Look for at the Flea Market

With its big round calibrated dial and lineup of control knobs, even an inexpensive hobby-grade unit might look impressive on a flea-market vendor's table. But you might want to consider looking for something better than those built-from-a-kit units made by Heathkit, Paco, Eico and the like.

It's not that they won't do a job for you, but the same ten to 20 bucks you might spend on such gear would also buy you a radio-service grade instrument – one that was wired in a factory and not in a home workshop. Look for instruments by firms like RCA, Hickock, Triplett and Simpson.

Flea market economics don't seem to assign a higher value to the service instruments than to the hobby instruments, and the former beat the latter hands-down in the sophistication of their circuitry and the solidity of their construction. Even laboratory-grade equipment can sometimes be purchased for similar prices, and I know people who stick up their noses at anything less. I'm not one of them.

The lab stuff is generally heavy and bulky, and it gives off the wrong vibes. It may seem silly, but I'd like my workbench to look like a radio repair shop, not a Lucent Technologies laboratory.

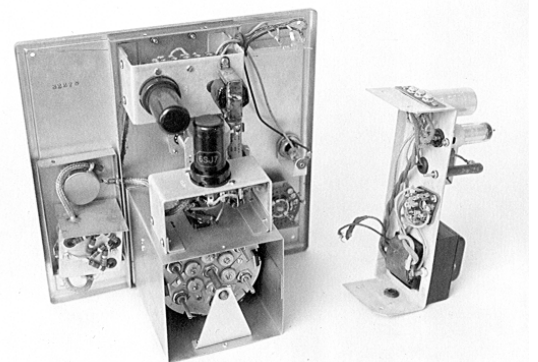
In all honesty I do have to add that – if your flea market find doesn't come with documentation – it will be easier for you to locate manuals for the hobby kit instruments than for the professional service-oriented instruments. And the kit instructions will give you beginner-oriented detail on trouble-shooting and adjustment procedures that you won't find in the professional manuals. So there are good arguments for both approaches.

Anyway, look for a unit that tunes down to at least 100 kHz (i.f.s in the older superhet receivers may be tuned this low), and up to at least 30 MHz (so as to cover the standard shortwave bands). It should have a switch that will allow you to apply modulation at a fixed audio frequency (usually in the 400 Hz range) to the r.f. signal as well as a control or controls (may be marked "attenuator") for adjusting the signal's output level. The tuning range should be divided into several bands, so that the scale for each band is long and easy to read.

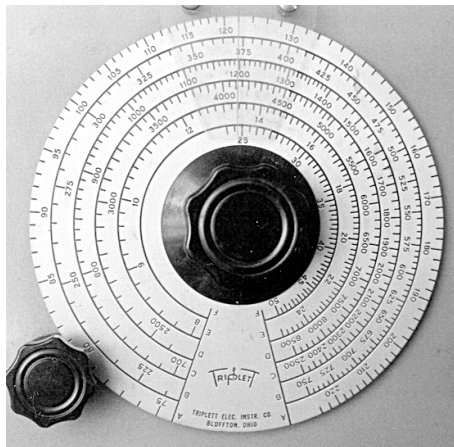
Actually, most r.f. generators will have these features, and you need to look beyond them for solidity of construction. Weight isn't a bad standard – indicating the presence of a heavy-gauge steel chassis that will prevent



Here's the Triplett 2432 as found at the 2000 Rochester Conference flea market. I was won over at once by its hefty feel (over 15 pounds), excellent cosmetic condition, and low \$10.00 price.



Rear view with power supply subchassis (right) and shield covers removed. Top subchassis (with the tube pointing at us) is the audio oscillator. Upright, below it, is the r.f. oscillator tube. The shield can containing the tuned circuit turret is below that.



The nicely engraved main tuning dial has concentric scales representing each of the six tuning ranges.

instability due to vibration and good internal shielding. Shielding is important because you want the only signal leaving the box to be squirting out of the test lead – not leaking out prior to the attenuation control(s). Also check for a nicely calibrated, smooth-acting and clearly marked dial with a good vernier control. If the frequency range is broken into several bands, than the dial markings for each band can be more spread out and easier to read and set accurately.

◆ My Own Flea-Market Find

Knowing that I would be writing this column in a few months, I shopped for a good signal generator at last September's Antique Wireless Association Convention (you can find out more about AWA and its convention at our web site: <http://www.antiquewireless.org>). Of course I already own a good signal generator, but it is just a little too sophisticated to discuss right now. I was looking for a unit that I would feel comfortable recommending in this column.

I didn't begin my search until about halfway through the meet, when the flea market was definitely beginning to thin out. Nevertheless, after only a short walk, I quickly spotted a nice-looking Triplet unit sitting forlornly on an otherwise almost empty shelf. It was marked \$20.00, but the vendor quickly accepted my \$10.00 bid.

The unit is a Model 2432 and tunes from 75 kHz to 50 MHz in six bands. It has main and vernier tuning controls, modulated output, and both coarse and fine attenuators. In addition to the r.f. output jack, there is a jack for direct access to the a.f. modulating signal. This is very useful for signal tracing in audio stages.

General cosmetic condition is very nice – with hardly a scratch on the brown hammertone paint. And the unit has a very satisfying heft (weighing in at over 15 pounds). In fact, I've had to avoid carrying the unit by its leather handle. The handle's

dried-out and fragile condition is the only defect I've noted so far.

After I got the Triplet home, I tried looking through old radio catalogues to see if I could find a description of this unit, as well as its original price – and also pin-point its age. The best I could do was a 1951 Allied Radio catalogue that showed what is clearly a later generation of the same instrument: the model 3432. The front panel was similar, but widened out for a different control arrangement. I have no catalogue that shows my own model – but its construction clearly pegs it as postwar, vintage somewhere between 1946 and 1950.

◆ Taking a Preliminary Look

Of course you are not necessarily going to acquire a Triplet 2432, but as we go through the instrument together I think you will see that you can apply similar techniques to your own flea-market prize.

After removing the four screws at the corners of the front panel, I was quickly able to slide the back off the front panel/chassis assembly. The only visible circuitry was on the power supply subchassis, which contains the power transformer, a 6X5 rectifier tube and an 0A2 gaseous regulator tube. (By the way, the regulated power supply is a feature that might well be absent in the inexpensive kit units). Everything else was hidden within a group of copper shield boxes. The view was rather daunting!

I usually check the condition of the power source before undertaking any radio restoration, and this one was no exception. I had to remove the power supply subchassis to access its circuitry, but that was an easy job. Backing out the four mounting screws, removing three spade lugs from a terminal strip, and unsoldering the power cord wires did the trick.

Removing the rectifier tube to prevent high voltage from reaching the filter capacitor, I connected a temporary power cord and tested the plate transformer. Its high-voltage winding and two low-voltage windings were fine. Setting the subchassis aside, I removed all the shields and took a look at the rest of the circuitry.

Behind the tuning dial is a small receiver-type 2-section tuning capacitor, and behind that a subchassis including a 6SJ7 tube – obviously the r.f. oscillator. It might well be that the two sections of the capacitor are switched to a parallel connection to reach the lower-frequency r.f. ranges and that just one is used for the higher ranges. However, I don't yet have a schematic diagram for the 2432. Above the tuning capacitor is another subchassis on which is mounted a 6J5 tube and a small audio transformer. Obviously, this is the audio oscillator circuitry.

In an enclosure below the tuning capacitor is the heart of the instrument, a rotating

turret on which are mounted a slug-tuned coil, as well as what looks like trimmer capacitor, for each band. These adjustments are lettered to match the positions on the bandswitch. As the turret is rotated, each coil/trimmer in turn is cut into the circuit via two sets of sliding contactors mounted inside the enclosure.

The construction of this unit is wonderfully simple and sturdy, and the quality approaches that seen in military units. Each subchassis is made of very heavy gauge metal and screw-attached to spot-welded right-angle brackets that are drilled and tapped for the mounting screws. With the exception of the power supply, every bit of circuitry that can be shielded is enclosed in a sturdy copper shield.

Just as I would with on a receiver restoration job, I plan to replace all of the paper and electrolytic capacitors before powering the unit up. Hopefully, I'll be in a position to report the results in next month's column. See you then!

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Interesting Aspects of Radio Wave Propagation

Most of us have been introduced to the basic ideas of radio-wave propagation. We have a good grasp of the ideas such as HF signals hopping between earth and ionosphere to cover great distances, and VHF and higher-frequency signals traveling in relatively straight, line-of-sight paths. But as we utilize radio for communication in a variety of situations we soon start to question whether these basic concepts are enough to always explain to us how a signal gets from a transmitting antenna to a receiving antenna.

◆ Diffraction and Knife-Edge Phenomenon

When I started listening to VHF signals one of the confusing things about radio waves for me was that, although they were supposed to travel in straight lines, I could receive signals when totally surrounded by hills, or in a deep gorge. Of course HF signals could bounce off the ionosphere to enter such

places, but VHF and higher-frequency signals don't usually propagate by ionospheric skip. To confuse the situation further, AM broadcast-band signals found me practically anywhere I went with a portable receiver. Even in places where the VHF signals couldn't make it through.

My confusion diminished when I learned of signal diffraction. Have you noticed how you can hear the siren of an emergency vehicle long before there is a clear line-of-sight path to that vehicle? Obviously then the sound is not traveling a straight path from the siren to your ears. Sound can reflect from surface to surface when following the path from its source to your ears. But usually the surfaces along that path (which is usually in traffic) don't support the amount of reflection that would be needed to get the level of sound you hear from the siren. Sound from the siren is actually dispersing (diffracting) around objects in its path as it spreads out from its source. Thus sound doesn't follow a strictly

line-of-sight path from the siren to your ears.

Signals from a radio antenna can behave in a fashion similar to the sound waves just discussed. Radio waves can disperse around objects in their path as they travel (fig. 1). This is known as "diffraction." So what happened to the idea of line-of-sight propagation for radio waves? Well, radio waves do tend to travel in straight lines, especially when there is no impediment to their travel. But there are exceptions to this, such as when waves follow a path that grazes the edge of an object that would otherwise prevent their passage. In such cases they diffract, just as the sound waves from the siren do.

If this grazing happens to be at the top of a mountain ridge, then diffraction may put a signal of usable strength into the valley below. This valley would otherwise be shielded from the signal by the mountains. That's probably why I could hear signals from antennas which were shielded from my antenna by the mountains.

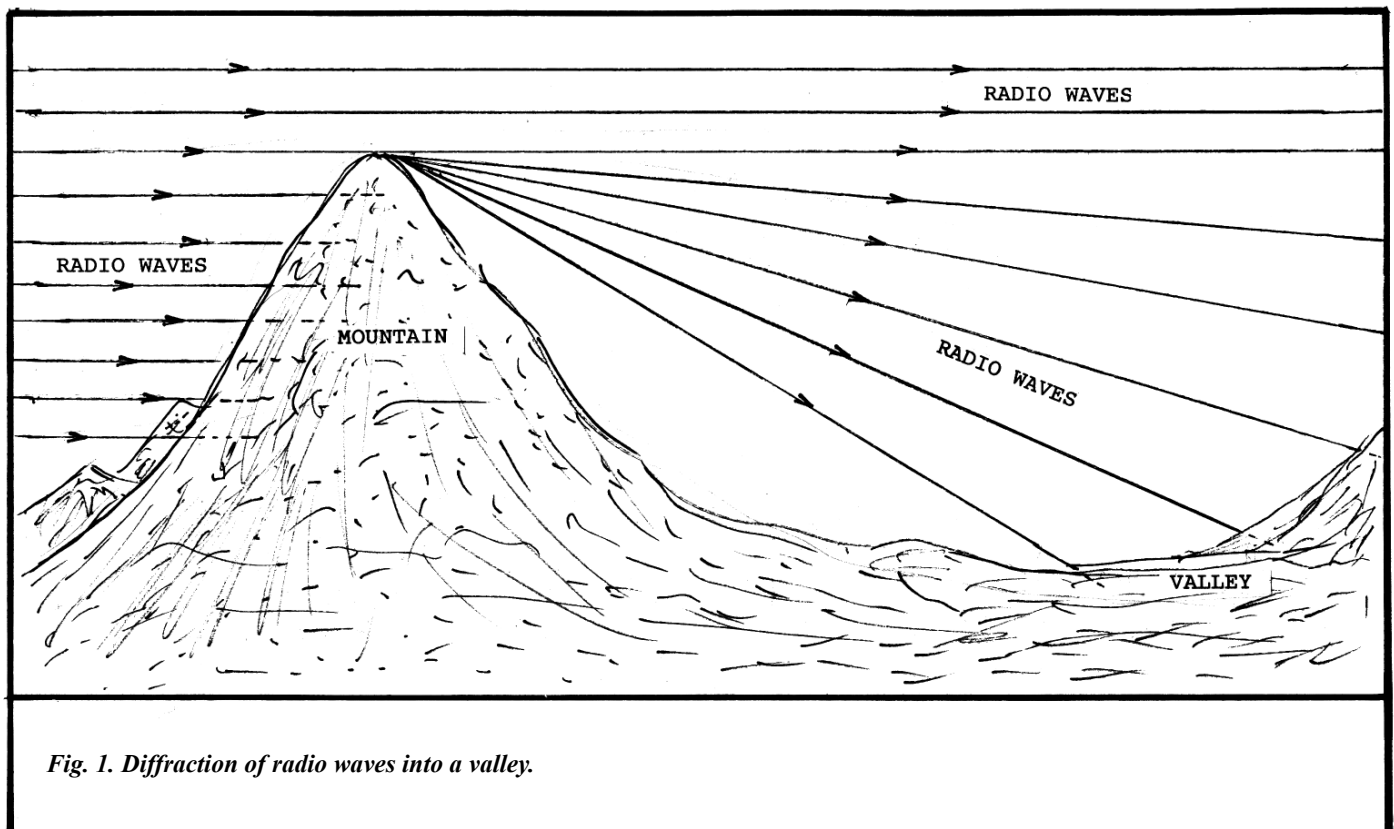


Fig. 1. Diffraction of radio waves into a valley.

This Month's Interesting Antenna-Related

Web site:

If you'd like to check out some free antenna programs look at:

<http://www.btinternet.com/~g4fgq.regp/>

Don't forget to send in your suggestions for inclusion here as an interesting antenna-related web site to: clemsmall@hotmail.com.

Have you heard a marching band coming down a side street where the band is blocked from your vision, and even somewhat from your hearing, by intervening buildings? You may have noticed that you heard the bass drum long before you could hear the higher-pitched horns. This occurs because there is more diffraction of lower frequencies (the drum) than of higher frequencies (the horns).

A similar situation exists with radio waves. There is more diffraction of lower-frequency waves than of higher frequency ones. Thus higher-frequency signals follow the "line-of-sight path" rule more closely than do lower-frequency signals. Knowing this cleared up my confusion concerning being able to receive relatively lower-frequency, AM broadcast signals essentially anywhere I went.

The greater diffraction at lower frequencies is also the reason why the U.S. Navy uses such very low frequencies for its worldwide communication network. When diffraction occurs on the VHF and higher band around a relatively-sharp object such as a mountain ridge, it is sometimes called "knife-edge" diffraction. In the very-low frequency and lower bands, wavelengths reach hundreds and thousands of meters in length, whereas at VHF and higher they are measured in meters, and fractions of meters. To those longer waves, the bulge or bend of the earth's curvature is, comparatively speaking, a relatively "sharp edge." Thus ground waves of these lower frequency signals can continually diffract as they travel around the globe. If very-high transmitted power is utilized this diffraction makes reliable world-wide communication possible.

◆ Another Way to Put a Signal into a Valley

Despite the help our radio coverage gets from diffraction it is sometimes difficult to cover mountainous terrain completely with readable signal levels. Fortunately, there is a useful mode of propagation which comes to our aid in such situations. Fiedler and Farmer in their excellent book, *Near Vertical Skywave Communication*, cover both the basic theory and the practical application of this mode. All the following information on this mode is covered in their book (available at \$14.00 plus shipping from: Worldradio Books, P. O. Box 189490, Sacramento, CA 95818; phone 1-800-366-9192).

Near vertical incidence skywave communication (NVIS), can often be employed with standard radio equipment through merely a change in antenna placement! Although some antennas have been specially designed to support NVIS, most horizontal antennas can be adapted to this mode by simply placing them closer to the ground (.1 to .25 wavelengths high). Sometimes they are placed on the ground, or even under the ground! Vertical antennas, such as mobile whips, can be adapted by bending them to become more horizontal. Both changes cause the antenna's radiation and reception pattern to emphasize higher vertical angles.

NVIS depends on ionospheric refraction of its upward-directed signals. These signals are transmitted at vertical or near vertical angles, and when they encounter the ionosphere they are returned back to earth to an area surrounding the transmitting antenna for a radius of perhaps 300-400 miles. Although upwards of 400 watts of transmitter power is advisable for NVIS, low-power backpack-type radios with only 20 watts of power can be utilized when received-noise levels are modest, and antennas are well matched to the transceiver. Frequencies employed vary from 2 MHz to 12 MHz, and, since this mode depends on ionospheric refraction, the frequency of these signals must be below the maximum usable frequency at the time of communication. When employed by knowledgeable operators, NVIS is a highly reliable mode of communications in mountainous terrain.

◆ Antenna Contest Coming Up!

Watch this column in upcoming issues of *Monitoring Times* for announcements of a contest held to find the most unusual antennas in existence! Keep your eyes peeled and your brain alert for antennas that are quite different from the ordinary ones we see everyday in the cities and countryside. We'll have rules and information on entering this contest with your choice for the world's most unusual antenna. We'll report the winner and runner-ups in a future column, and there will be a prize for the winning entry!

RADIO RIDDLES

Last Month:

I said: "OK, so we've talked about radio horizon, radio ground, radiovision, and radionics. Now what does "radiotrician" mean? Well "radiotrician" is another of those terms whose day is past. Although we seldom, if ever, hear this term nowadays it has been used in the past as an acronym for "radio electrician." Over time this term was replaced by "radio serviceman." Now we are more likely to hear the term "radio technician" than either of the two earlier terms.

This Month:

OK, so we've worried about radio horizon, radio ground, radiovision, radionics, and radiotrician. Now just what is "radio" anyhow? The answer may not be as simple as you think!

You'll find an answer for this month's riddle, another interesting, antenna-related web site, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

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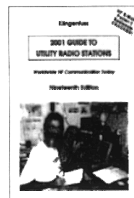


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AOR's Pocket ACARS Decoder

This month we are going to look at AOR's almost-pocket-size, battery-operated, standalone ACARS (Aircraft Communications Addressing and Reporting System) and NAVTEX decoder and display unit – the ARD-2.

ACARS is a very interesting air-to-ground digital mode used by commercial and biz jets to report aircraft operations on VHF. We'll compare its performance to a laptop computer running WACARS, a freeware ACARS decoder program. We're cleared for immediate departure, so let's go.

◆ Where and What is ACARS?

ACARS has been a topic of many columns in *MT* over past years. In this age of signal encryption, ACARS is a digital mode of communication which is transmitted in the clear by airliners. In the USA and Canada ACARS can be monitored as an "eeking" 1 second pulse on 131.550, 131.475, 130.450, 130.025 MHz and 129.125. In Europe, ACARS signals can be found on 131.725, 131.525 and 136.900 MHz.

The airliner's aircraft registration number (which is printed on the fuselage), aircraft type, airline company and sometimes its location, can be easily decoded and displayed using a personal computer.

◆ AOR's Product Concept

With the current trend of shrinking communication receivers to the size of a pack of cigarettes (witness the ICOM R2 and Yaesu's VR-500), AOR has produced an ACARS decoder and display product that is battery-operated and not much bigger than these new receivers. The ARD-2 only requires a connection to a receiver's speaker/headphone jack. Then the ARD-2's two-line dot matrix liquid crystal display shows ACARS data. Decoded data can be scrolled on the display using two scroll buttons.

The ARD-2 is about the size of a thick calculator and uses four AA batteries. A jack for a 12 volt external AC power supply is provided on the back of the ARD. Turning on the unit puts the unit into the ACARS-1 mode.

The ARD-2 is very simple to operate. First connect the audio output of a receiver,

tuned to an active ACARS frequency, to the ARD-2. Then adjust the level control so that the red Decode LED on the ARD-2 panel lights when an ACARS signal is present. Data will begin to appear on the display.

In the ACARS-1 mode, valid ACARS signals will be displayed as six data fields: Mode Number, Aircraft Registration Number, Message Label Number, Message Block Number, Message Sequence Number and Flight ID including a Message Content. Lots of interesting data appear in this last field. This includes position information, estimated arrival times, fuel on board, equipment malfunctions and special instructions.

◆ Nice Additions

AOR has added some thoughtful features to the ARD-2. Once you connect to a receiver's speaker output, this disconnects the radio speaker. The result is that you can no longer hear what you are monitoring. The ARD has an internal speaker and volume control, so you still can hear the output of your receiver. The ARD-2 also has extra audio jacks for connecting other decoders and equipment. In a minute we'll make use of this capability to see how the ARD-2 and a PC ACARS decoder compare.

On the back of the ARD-2 I found a 9 pin connector; AOR designers have thoughtfully included a serial interface so data can be transferred and displayed on a computer. All it takes is a serial port cable and a PC running Windows Hyper-Terminal. In order to take advantage of the ARD-2's unique standalone capabilities we did use it attached to a PC in the serial data output mode.

◆ How Does It Work?

Now that we have the ARD-2 set up let's run WACARS, available free on the internet, on a Pentium I, 120 MHz laptop, running under Windows 98. The Line-In jack of the computer's sound card is connected to the

ARD-2's Ext Sp connector. Then we wait for a solid ACARS signal.

The ARD-2's red light blinks and its display shows "Mode 2." Pressing the scroll button results in the sequential display of the two lines (top and bottom) shown in Figure 1.

The WACARS decoder computer screen of the same signal is shown in Figure 2. You can see that both have decoded the same basic data. However, WACARS's databases have added more details such as the fact that flight N418UA is an Airbus A 320-232 aircraft. Also, in the Message we see that WACARS has translated BOS into BOSTON and IAD into Washington. These "translations" make the message much easier to understand. But, both decoded the same raw data.

I found that in most cases, the ARD-2 and the laptop running WACARS were comparable in their decoding capabilities. That's pretty good for a little battery-operated, standalone decode and display unit.

◆ A Rough Landing?

As we have seen the ARD-2 performed well. But using the ARD-2 has its difficulties. For one thing, you cannot read previously received decoded messages while you decode new messages. Once you press a scroll button the decoding function is suspended until you hit the Decode Start button. This method of operation is not very convenient and caused me to stare at a non-moving display wondering what was wrong, while missing decodes.

Reading data using two limited-length lines at a time is not easy. Sometimes it gets in the way of understanding the message. The ARD-2's internal memory limits the recallable decodes to two or three. After three or so decodes have been received and stored, they are overwritten by new incoming decodes.

Since operating current requirements is

ACARS Decode From ARD-2

Press 1	Press 2	Press 3	Press 4	Press 5	Press 6 & 7
Aircraft Reg:	Message Label:	Block id:	Msg. No:	Flight ID:	Message Content:
.N418UA	5Z	9M19A	UA1981	/R3 BOSIAD	1981-30 BOS

Figure 1 - ARD-2's Line-By-Line Decode of an ACARS Signal

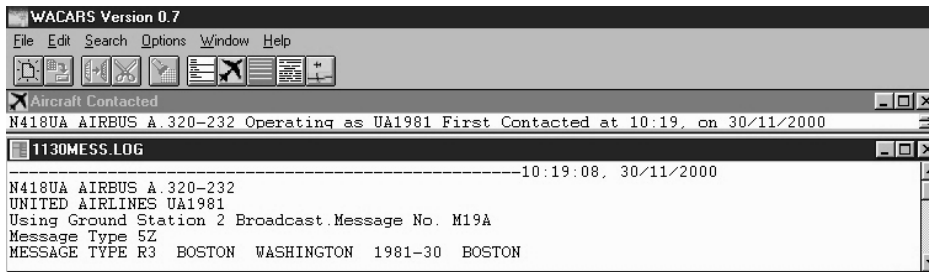


Figure 2 - WACARS Screen Shot of the Decode of the Same ACARS Signal as in Figure 1

high, 180ma, the battery life is limited to about 6 to 7 hours. With very little use of the display's backlight I could only get about 6 hours from a set of batteries before the unit started flashing uncontrollably. This flashing also occurred with a second set of fresh alkaline batteries after 6 hours of continuous use. I believe this indicates that a peak current requirement of the ARD-2 can no longer be met by the used batteries.

The first set of batteries tested very low under a standard load. But the second set of batteries tested in the low end of the acceptable range, thus confirming the peak current theory. Although I had about thirty "wall wart" power adapters in the workshop, I could not find one that fit the power connector on the ARD-2.

Finally, compare the costs. The ARD-2 weighs in at a hefty \$250, close to the cost of

a used Pentium I laptop. WACARS, an excellent program, with features we have not discussed, is freeware, costing little to nothing.

♦ Small + Standalone = ARD-2

For many of us the price comparison will be the deciding factor. However, if you must have a pocket size ACARS/Navtex decoder, then the ARD-2 does a great job and is the only game in town. The AOR ARD-2 is available from Grove at <http://www.grove-ent.com>. Also check AOR's website at <http://www.aorusa.com/main.html> and <http://www.aoruk.com/Default.htm> for updates and product specifications. The excellent WACARS program, whose modest minimum requirements are a Pentium I 100 MHz, Windows 3.1 and 8 MEG of RAM, is available at

<http://www.geocities.com/CapeCanaveral/Cockpit/9870/acars.html>

Also check out these sites for more ACARS info, decoder, support programs and ACARS links:

<http://patriot.net/~acars/>

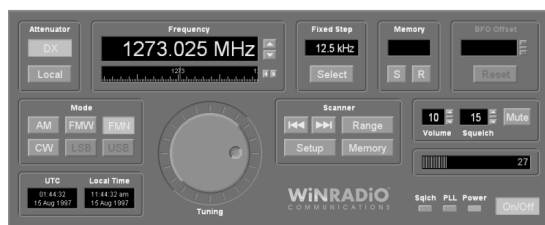
<http://www.tardis.ed.ac.uk/~kr/kracars/index.html>

♦ One Final Thought

Does anyone know of an ACARS decoding program for Palm Pilot, Windows CE or the Pocket PC? That would be sweet! Email me if you know of any such decoder applications for these PDA/handheld computers and I'll pass them along to everyone.

♦ What's Next?

As a very active pilot at the time, I remember when ACARS was born. It has been around since 1978 when it was first introduced into commercial aviation. In the electronics industry nothing lasts forever. So what will replace ACARS? When will it be introduced? You may be surprised by some of the answers. Next time we'll compare the proposed new system to our old friend ACARS and share some readers' letters. Remember, when the snow flies so do the ACARS messages.



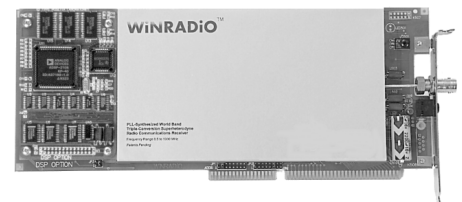
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AOR AR8600: Part 1

The arrival a few years ago of the AOR AR8000XLT was a much-heralded event; it was arguably the best hand-held scanning receiver on the market. With wide frequency coverage from below the AM broadcast band to above 1000 MHz, sporting multimode reception including single sideband, and with good strong-signal-overload resistance, it stood at the top of the thin rank of super scanners.

The subsequent upgrade to the AR8200XLT, and most recently the AR8200XLT Mark II, gave it even more respect among experienced scanner listeners. But AOR wasn't finished yet; they still didn't have a desktop/mobile unit.

Now being delivered to dealers, the new AR8600 is essentially an AR8200 in a bigger box. It has a wide choice of functions, but some of the compromises of a small, price-competitive radio as well. The 143-page manual is comprehensive, well written, and informative. Unlike many Asian-written manuals, this one is in readable English!

This month we will take a look at the 8200's 100 kHz-30 MHz performance; in our next installment, Bob Parnass will concentrate on 30-2040 MHz.

◆ Description

The unit is slightly larger than a conventional, under-the-dash CB or scanner (see specifications below for measurements). A front tilt bail allows the unit to face up toward the operator for desktop applications. Frequency entry is by a multi-function numeric keypad; a detent-type tuning knob allows manual slewing across the spectrum, and may be fast/slow commanded by touching adjacent tuning-speed keys. Power may be derived from a mobile or portable 12 VDC source, an optional BP6000 internal battery pack, or from the

AC adaptor (included).

A temperature-compensated crystal oscillator (TCXO) assures excellent frequency stability. The receiver is factory-preprogrammed for automatic selection of mode for any frequency; this default is defeatable by a manual mode selection.



Front panel controls include volume (with on/off switch), squelch, and tuning. The LCD and all function keys are brilliantly lighted (defeatable for battery conservation); signal strengths are displayed on a horizontal bar graph.

Rear panel jacks are provided for antenna (BNC, 50 ohms), IF output for optional SDU5500 (BNC, 50 ohms), 12 VDC power (standard coaxial plug), plug-in ferrite antenna for medium wave broadcast (included), optional speaker (1/8-in. mini jack), and a standard 9-pin RS232 for elective computer control.

A DIN socket provides several modes of audio for recording, as well as unfiltered detector output for data decoding. A tape-recorder activation control line is there, as well as +5VDC @ 30 mA for powering an optional digital device.

And there are five slot-card ports to accommodate options like: 20-second digi-

tal record/playback, 4000 channel external memory, voice inversion decoding (available only to government users), CTCSS, and audio tone eliminator.

While an admirable selection of reception modes and filters is provided, there is no synchronous detection. Collins mechanical replacement filters for SSB and AM are available on special order.

The rugged diecast cabinet is well fabricated and provides an extra measure of shielding. A single BNC antenna connector is used for the entire frequency range; a telescoping whip is included for near-field monitoring. The two-inch, top-mounted speaker provides remarkable audio quality and volume for its size.

Favorite frequencies and modes may be stored in up to 1000 memory channels in 20

banks, with a search/scan rate of 37 channels per second. The radio comes with factory-memorized frequencies of interest and band plans for the U.S. market. On-screen menus are readily navigated for custom programming.

In our next (final) installment, Bob Parnass will discuss the VHF/UHF performance, including the flexible scanning features which are more applicable to that portion of the spectrum.

◆ Sensitivity

The ability of a receiver to detect weak signals is of paramount interest to most listeners. The AOR will actually tune down as low as 100 kHz, but below the AM broadcast band (530-1700 kHz) it is profoundly lacking in sensitivity. At 100 kHz, LORAN-C was only faintly audible, while strongly heard on a comparison receiver, and a local 335 kHz aircraft beacon could

be barely heard in the background hiss, also strong on the comparison receiver.

At medium wave, local broadcasters came in loud and clear with the external antenna connected, but when we attempted to use the plug-in ferrite bar antenna alone, signal strengths dropped dramatically. When the receiver is tuned above 1.9 MHz, the BNC antenna connector is automatically selected, and the ferrite bar is deselected.

◆ Selectivity

In the crowded spectrum, a receiver must be able to discriminate between the desired signal and the adjacent-frequency signals often interfering with it. Communications receivers thus employ filters with steep "skirts," i.e., sharp attenuation of signals just above and below the frequency of the tuned signal.

Such filters are relatively expensive, and they are unnecessary in VHF/UHF scanners where signals are reasonably spaced by a regular channelization plan. But at shortwave, signals are found wherever they happen to be, and sharper selectivity is the norm.

Unlike some other manufacturers who choose to use the same wide filters at shortwave that they use on their VHF/UHF radios, AOR wisely provides wide, medium and narrow filters to allow the user to optimize his receiver selectivity for band conditions.

Specifications

Display: Large, edge-lighted LCD with 12-character alphanumeric capability.

Frequency range: 530 kHz-2040 MHz (tunable down to 100 kHz with reduced sensitivity)

Modes: AM, WAM, NAM, USB, LSB, CW, WFM, NFM, SFM

Tuning steps: 50, 100, 200, 500 Hz; 1, 2, 5, 6.25, 8.33, 9, 10, 12.5, 20, 25, 30, 50, 100 kHz

Sensitivity: 1.5 μ V SSB, 2.5 μ V AM (3.5 μ V 530 kHz – 2 MHz)

Selectivity: 3, 9, 12 kHz AM; 3 kHz SSB

Antenna connector: BNC; telescoping whip provided

Power requirement: 12 VDC nom. (10.8-16 VDC max.) @ 350 mA, AC adaptor included

Computer control: RS232 port

Size: 6"W x 2-1/4"H x 7-3/4"D

Weight: 3.3 lbs.

◆ Spurs

The presence of "wandering birdies" is quite pronounced on the medium wave broadcast band. When first turned on, the ascending and descending whistles are heard at approximately 50 kHz intervals. They don't go away, but merely stabilize somewhat after warm-up. These internally-generated spurious signals were widely reported in earlier AOR scanners like the AR1000. Fortunately, they are absent above 2 MHz.

The shortwave spectrum is quite clean of self-generated signals – one or two minor artifacts heard here and there – but unusually clean for a moderate-cost, broad-spectrum receiver.

◆ Dynamic range

For top performance, a receiver must be able to handle equally well weak and strong signals. It's a design juggling act, since high-sensitivity receivers often overload easily with strong signals, producing desensitization as well as intermodulation; both are highly undesirable characteristics. Conversely, circuits which withstand the onslaught of strong signals often have poor sensitivity.

With an outdoor antenna connected, and being tuned for shortwave reception, the AR8600 exhibits considerable intermod, evidenced as a constant background din of mixed signals which aren't really on those frequencies. The overload is most prominent at night when signals are strongest.

Selecting the attenuator reduces the interference considerably, but it is still there. An external attenuator or smaller antenna would bring the signal levels down to an acceptable level.

◆ Single sideband

With the singular exception of 27 MHz CB, the vast majority of shortwave voice communications are in the single-sideband (SSB) mode, with upper sideband (USB) dominating. The 8600 offers a selection between upper and lower sideband (LSB), offering true carrier re-insertion. Fine tuning is in 50 Hz steps, marginally adequate for resolving voices to natural-sounding intelligibility, but not music.

If a user wants to use a sharp-filtered digital decoder for reception of packet, RTTY, etc., it may require a much tighter adjustment of mark/space tones than the 8600 is capable of providing.

◆ Band scope

The ability to display signals visually on a screen is a desirable feature, usually accomplished by an accessory spectrum display unit. The multifunction band scope

in the 8600 shows signals throughout a 10 MHz span, operates in a peak-hold condition, and even stores the trace for later recall.

Because of the slow sweep time – nearly a minute for a 10 MHz span at 5 kHz intervals (faster for smaller spans and larger steps) – the feature is not as reliable as a real-time CRT for catching on-off keying by two-way radio users, but it does show the presence of constant carriers from AM/FM/TV broadcasters and other longer-term signals.

A 10.7 MHz IF output is provided for an external spectrum display unit like the SDU5500. It is internally set to operate only in the WFM mode in order to minimize spurious signals that may be heard on narrower filters. If all-mode SDU display is desired, an internal jumper may be moved (from R500 to R501).

When used with a standard SDU like the AVCOM SDM42A, the maximum span is 4 MHz. The 8600 must handshake with the companion AOR SDU5500 for full function.

◆ The bottom line

While not satisfactory as a primary receiver in a serious, analytical environment, the AOR AR8600 is a worthy contender as a wide-frequency coverage receiver where compact size, self-powered portability, and modest cost are the prime considerations. It does a very good job with a small, all-band antenna, and it is feature-packed.

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RT Systems Software for the Yaesu VR-500

We reviewed the Yaesu VR-500 portable, wide coverage scanner in February 2000 *MT* (fig. 1). Its tiny size, 1000 channel memory capacity, and alpha labeling make the VR-500 attractive. The VR-500's full numeric keypad makes it easier to enter frequencies than its ICOM IC-R2 competitor (April 1999 *MT*). Despite the improved keypad, it's easier to program the VR-500 using a personal computer.

There are compelling reasons to use a personal computer for scanner programming. Programming more than a couple of dozen frequencies is time consuming, especially if you program alpha labels along with the frequencies. It's easier to type them on a full size computer keyboard than a small radio keypad. Programming via a PC saves wear and tear on the radio keypad, which is more expensive to replace than a \$15 PC keyboard, a commodity item these days.

In theory, the radio should retain its memory contents for a long time even when batteries are removed. But, some of us have accidentally "wiped out" memory contents when experimenting with undocumented keystroke sequences or zapped them with static electricity on a dry day.

◆ RT Systems VR-500 Programmer

RT Systems is an American firm best known for developing Yaesu programming software. We've used their ADMS-1C software for years to program a FT-50R dual band walkie-talkie. RT Systems now offers ICOM, Alinco, and Kenwood programming software, too.

The ADMS-3 package includes both ADMS-3U Windows software on floppy disk and a CT-29A radio to PC cable. While the software is designed specifically for the VR-500, the CT-29A cable is usable with several different radios.

The CT-29A cable is well constructed. It

is fitted with a 9 pin serial port connector on one end and a 3-conductor 1/8" plug on the other, which plugs into the VR-500. It comes with a 3 to 4 pin plug adapter for use with other radios. We use the CT-29A with the VR-500, FT-50R, and an ICOM IC-R2.

The ADMS-3 package sells for \$39, but RT Systems sells the software and cable separately for \$20 and \$25 respectively.

We installed software version 2.01 for this review, running under Microsoft Windows 98 SE on a 266 MHz Pentium II processor. Installation is straightforward.

Unlike other software, e.g., the SONY ICF-SC1PC, ADMS-3 lets you choose any COM port. You select or change the COM port setting from within the program after installation.

◆ Main Window

ADMS-3's main window (fig. 2) is visible at all times. Major sections are represented as tabbed pages: memory channel programming, VFO scan (search limits), Dual Watch memories, Auto Band (band plan), global settings and Preset Mode.

File, Radio, and Help pulldown menus are listed in a row along the top. Oddly, there is no Edit menu. The cut, copy and paste icons are always grayed out and are not functional. Experimentation shows that CTL-X, CTL-C and CTL-V keystroke combinations perform cut, copy, and paste operations after clicking on a frequency in the Memory View page. They are not documented in the Help file.

◆ Memory View Page

The Memory View page contains a single grid or table of 1000 memory channels. The VR-500 sup-

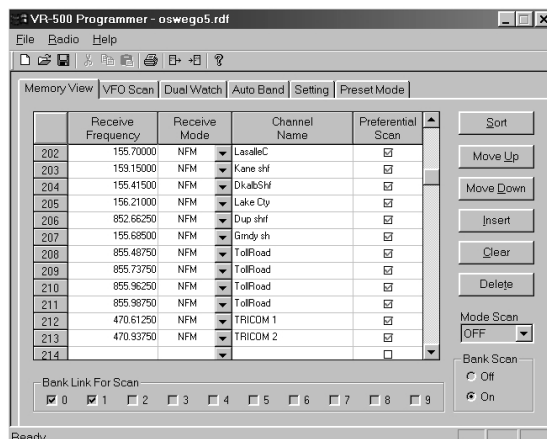


Figure 2. ADMS-3 main window and Memory View page

ports 10 memory banks but the ADMS-3 grid shows the entire memory as single table. Only 13 channels are visible at a time and you cannot resize the window to see more. You must use the vertical scroll bar at the right margin to bring other channels into view.

Buttons down the right side are useful for sorting and moving data within the table. You can sort some or all of the channels by one or two criteria: by frequency, label, mode, and preferential scan.

The Memory View page contains scanning parameters as well, including check boxes representing the banks to be scanned.

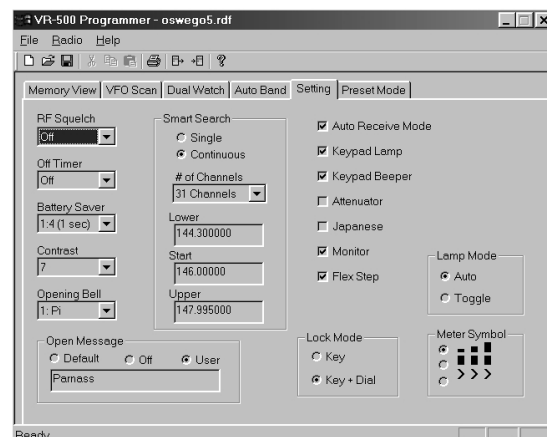


Figure 3. The Settings page controls global parameters

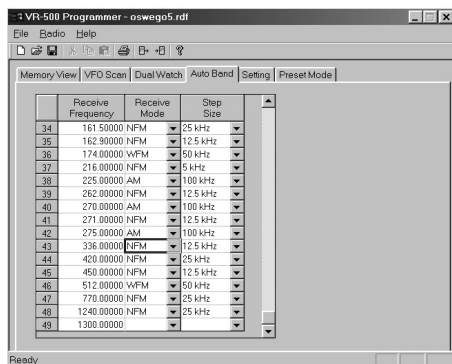


Figure 4. Auto Band page

◆ Setting Page

The Setting page (fig. 3) allows access to the parameters which "personalize" the VR-500, e.g., the keypad confirmation tone, S-meter symbol, initial display greeting message, display contrast, etc.

Timer, battery saver, and Smart Search (auto store) limits are set here, too.

◆ Importing and Exporting Data

Higher quality radio software provides the ability to exchange data with other programs. ADMS-3 software lets you export the frequency, label, and preferential scan flag fields to either a tab (.tab) or comma (.csv) separated values file for further processing by other programs. We wish it could export the channel number, too, so you could read them into Microsoft Excel and print custom formatted frequency listings.

Frequencies and mode data may be imported from tab or comma separated values files.

◆ Other Features

Search limits, search parameters, and skip frequencies are established using the VFO Scan page Band scope and priority channel information are programmed here, as well.

Mode and step size defaults are determined by frequency and alterable on the Auto Band page (fig. 4).

A print facility allows you to create a paper report of all memory channels. An options window offers control of several print formatting parameters, but ADMS-3 ignores them and prints an entire frequency list using its own settings instead! We con-

firmed the defect with another ADMS-3 user and reported the problem to RT Systems.

◆ Overall

There are several free and commercial programs available for programming the ICOM IC-R2, and this makes the IC-R2 attractive. By contrast, VR-500 owners are currently limited to ADMS-3.

Fortunately, ADMS-3 does most of what it's supposed to do and is simple to use. The version 2.01 software has a few defects and omissions.

ADMS-3's single memory table is counter to the way we visualize memory banks. We prefer the paradigm employed by Butel's ARC2 software for the ICOM IC-R2, which uses a separate tabbed page for each memory bank.

The CT-29A cable is an excellent product due to its construction and adaptability to different scanners.

For more information, contact: RT Systems, P.O. Box 12188, Huntsville, AL 35815, telephone 1-800-750-9689 or visit their web page at <http://www.rtsars.com>.

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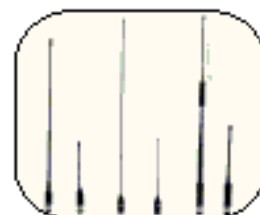
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MT REVIEW

Emerson Universal Multi-System Video Converter

By Ken Reitz KS4ZR

History is filled with weird anecdotes of engineering oddities. And, while we may be inclined to believe that in our modern computer dominated world we are all in agreement as to engineering standards, we don't have to look far to find proof of the opposite. Even the precise world of computer engineering struggles with Mac and PC standard deviations. Two decades ago it was VHS versus Beta, and thirty years ago it was eight track cartridge versus cassette. A reasonable person might expect that the best engineered system wins, but, a reasonable person is always shocked to find that isn't true.

Consider the world of color television. In the U.S., as television progressed in the 1940s, there were so many incompatible standards for television broadcasting that an industry-wide organization was formed in 1948 to set, once and for all, a television broadcast standard. The organization was the National Television System Committee and the American standard would be forever known by the Committee's acronym: NTSC. Nearly a decade later the French had improved upon the NTSC standard with its own Sequential Color A Memoire or SECAM. Four years after that the British had a go at improving things and developed its system known as Phase Alternating Line or PAL. Now, these "improvements" were not exactly earth shaking in their differences, but the differences made it so that none were compatible with any other.

Following a confusing pattern of adoption, all countries around the world have opted for one of the three systems. As a result PAL is used in Britain as well as much of Africa; France uses SECAM; many eastern European countries including Russia also use SECAM; Latin America uses a patchwork quilt of all three including three variations on PAL; the U.S., Canada and

Mexico use NTSC as do Nicaragua, Cuba and the Philippines.

◆ Emerson's Video Converter in Action

Before the introduction of Emerson's Universal Multi-System Video Converter the only ways to convert PAL to NTSC or vice versa was to use a multi-standard video monitor/TV set or a multi-standard VCR. Both are traditionally more expensive than their less talented counterparts and force the user to lug around another big



piece of electronic gear. The Emerson converter really helps in that department because it's barely bigger than a video cassette, weighs in at just one pound, and the design couldn't be simpler.

The back panel has an RCA video input jack, into which the source video is plugged, and an RCA video output jack which takes the converted signal to your PAL or NTSC TV set. The unit is set up to automatically detect the type of video received, but you can manually change the input with an Auto/Manual switch. An LED on the front panel indicates which input you chose. Another LED lights on the front to indicate the type of video received.

For the unit to work properly you must take the video from any source (satellite receiver, camcorder, laser disc or VCR) via the familiar yellow, white and red RCA jacks. The yellow jack is video out and the other two are for left and right audio. There are no coax connections. For proper reception and to get both video and audio you must use a VCR or TV set equipped with the three RCA jacks.

The Emerson converter is most useful for people on overseas assignment who don't want to have to buy new TVs or VCRs and for satellite hobbyists who want to be able to watch international transmis-

sions. These transmissions are occasionally found in both C and Ku-band and most frequently are sporting events being backhauled to England. The Emerson converter will work with both analog and digital satellite receivers.

What this product won't do is allow you to play a PAL recorded video tape in an NTSC VCR; the conversion is done with the output signal of the video device. If you want to watch PAL format videos you'll have to use a PAL VCR.

The Emerson Universal Multi-System Video Converter (model #EVC1575) retails for \$219.95 and is available from Skyvision at 800-500-9275 or visit their web site at <http://www.skyvision.com>.

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What's NEW

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AR8600 Receiver

AOR's AR8600 is an extremely versatile receiver with all-band (from 530 kHz to 2040 MHz, less cellular) and all-mode capability (WFM, NFM, SFM, WAM, AM, NAM, USB, LSB, CW). It can be used virtually anywhere – mobile, base or portable – since it can be powered from an external 12V d.c. power supply, optional d.c. lead from a 12V vehicle, or from an optional internal NiCad battery pack. Its double-walled metal case and die-cast front panel add to its shielding and durability. An RS232 port further extends the capabilities with free control software available from the AOR web sites.

Although many features were

quency offset facilities are also provided to ensure tracking of the most obscure band plans.

The AR8600 contains 1,000 memory channels in 20 banks; can accommodate 50 select scan channels and 1 priority channel; and has a maximum scan/search speed of 37 steps per second. The AR8600 is now available for \$899.95 from Grove Enterprises (1-800-438-8155) and other leading dealers.

See Bob Grove's review of the HF portion of the AR8600 in this issue on page 82; watch for Bob Parnass' take on the 8600 as a scanner in a later issue.

Also watch *MT* for announcement of AOR's JT2000 cutting edge, computer-host receiver, rumored to have a February release date.

New Shortwave Receiver from Patcomm

Patcomm Corporation came into being as recently as 1993, but one look at the design of their amateur radio transceivers and the RX-16000A HF receiver tells you these folks know their business. According to the literature, the 16000 is a multi-mode receiver that covers 100 kHz to 30 MHz on CW, SSB, RTTY/ASCII and AM. A built-in modem decodes CW and RTTY/ASCII text on the large, easy-to-read display, and a keyboard interface to the included AT style keyboard is also built-in.

The RX-16000 uses 2.4 kHz and 500 Hz Collins mechanical filters for IF selectivity in CW and SSB modes; a 6 kHz ceramic filter is used on AM. Digital signal processing filters help clean up the audio even further, aided by noise fighting features like IF shift, manual notch filter, fast/slow AGC selection, and noise blander.

Frequency selection and the 90 memory channels are accessed from the keyboard or the front panel.

The chassis is aluminum and measures 14.5 inches wide, 15

inches deep, and 4.25 inches high.

This high end receiver has a price to match the high quality of its components: list price is \$1,295. For more information on this advanced receiver, visit <http://www.patcommradio.com> or write or call Patcomm Corporation, 7 Flowerfield Suite M100, St James, NY 11780; 631-862-6511, patcomm1@aol.com. A computer-hosted version of the 16000 may also be available.

Talk to the Satellites

ICOM has announced a new amateur radio transceiver with enough power to work the satellites without requiring an external power amplifier. The IC-910H is a VHF/UHF all mode transceiver with 100 watts of power – although preamplifiers for each band are still an option for an extra boost and optional digital signal processors (DSP) can provide better signal-to-noise ratio.

Two data sockets provide easy packet connection for simultaneous operation on two bands. A limiter prevents modulation whenever the input level to the radio is exceeded.

The display is a generous 3.5-inch screen, even though the receiver is small and easily transportable for

Through an innovative use of a colored LCD, a microcomputer and a one handed quartz movement you can see at a glance how much daylight and nighttime is in the 24-hour cycle, when sunrise and sunset is and what phase the moon is in.

DXers know that best reception is often during those hours or minutes when a path of darkness lies between their location and the station they are trying to hear. The YES watch shows not only the remaining darkness for your own location, but keeps time for up to three locations simultaneously.

The user chooses between 12 hour and 24 hour digital time display; it automatically adjusts for DST. YES watch shows accurate sunrise and sunset times, month, date and day.



Other features are a sunrise and a regular alarm, 24 hour stopwatch with lap time, water-resistance, and nighttime illumination.

With Swiss parts movement and state-of-the-art electronics, the YES watch ranges in price from \$199 to \$399; the stainless steel design is mid-range at \$299. For more information, visit <http://www.yeswatch.com>, or write or call YES, 2269 Chestnut Street #618, San Francisco, CA 94123; 1-877-YESWATCH.

Snoop Out Snoops and Snitches

As miniature wireless cameras become smaller, cheaper and easier to hide, the general public is growing wary of being watched by hidden cameras planted in hotel/motel rooms, public restrooms, rental units, dorm rooms, dressing rooms, etc..



field day or other portable operations. Control is via a 10-key entry pad, direct entry or memory channels.

The DC power cable and HM-12 hand microphone are included. The 910H is still awaiting FCC type acceptance, so check out availability and pricing on the 910H at your ICOM dealer or visit <http://www.icomamerica.com>

DX Edge for the Wrist?

DXers might have special reason to be interested in a new watch collection introduced by Wild Seed Inc. in San Francisco, California.



adopted from the sophisticated AR8200 Series-2 hand held receiver, the AR8600 RF front-end is an all new design with preselection around VHF to ensure the highest levels of adjacent channel rejection.

In addition to a hinged telescopic whip aerial, the AR8600 is supplied with a detachable medium wave bar aerial for localized medium wave monitoring. An additional BNC socket is mounted on the rear chassis so that 10.7 MHz i.f. output may be extracted for use with an external spectrum display such as the AOR SDU5500.

The frequency display is a multi-section back-lit LCD with alpha-numeric text. Controls include numeric keypad, navigation keys, rotary tuning control and separate controls for volume and squelch control.

Channel steps are provided in a menu and may be programmed. Step may be programmed by the operator in any receive mode using multiples of 50 Hz in any mode (i.e. 5 kHz, 12.5 kHz or even 1.25 kHz). The all important 8.33 kHz air band channel step is correctly implemented (eight-and-one-third, 33, 66, 00). Extensive step-adjust and fre-





Now there's a personal protection device known as the Plus Guard. This little device, designed to fit on a key chain, is made to discreetly locate hidden transmitters. Fitting in the palm of your hand, the Plus Guard is

convenient, inexpensive and easy-to-use. Simply press the side button and it looks for radio waves being emitted by hidden transmitters. A **yellow light** means no transmitter has been detected; **orange** means radio waves have been detected in the general area; a **red light** appears as you home in on the transmitter. The red light then blinks with a low audio alarm within inches of a transmitter!

To their credit, the website does post a cautionary note regarding false alarms, listing TVs, Cell/PCS Phones, 2-way pagers, 2-way radios, computers, etc. as other possible sources of RF.

Included are an optional antenna for extended range and batteries. Plus Guard is available for \$42.95 from many Ham Radio Outlet stores, counter surveillance shops, or online from KK6YO's Ham Shop (follow the links from <http://www.theplusguard.com>, or contact 4455 Torrance Blvd. #294, Torrance, CA 90503, 1-888-630-6666, Fax: (310) 533-0779; Email: sales@kk6yo.com)

Police Call Radio Guide

Southern California Edition
by Gene Hughes

Hughes' new 2001 guide to scanner monitoring focuses on federal government, military, law enforcement, radio/TV news teams, amateur repeaters, conservation, entertainment, and security frequencies. Even though Southern California is the emphasis, many agencies (like military and federal government) utilize nationwide allocations, making this a good reference guide across the country for spectrum exploring.

An introductory chapter on scanner technology, repeater architecture, and signal propagation is an excellent tutorial for all listening hobbyists. Cross-listed by frequency and agency, listings also include location, channel ID, unit designators, call signs, and CTCSS tones.

\$14.99 plus \$3 shipping from U.S. Radio Data, 11 Deer Hill Rd., Lebanon, NH 08833.

Short-Range Wireless Communication

by Alan Bensky

The gradual reduction in wired electronics has created a whole new field for short-range radio systems. Computers, phones, control systems, signaling, security, and more all require transmitters, receivers, antennas, programming, and many other hardware/software considerations.

Bensky's text is designed for RF engineers who don't mind the math. Block diagrams showing signal paths, along with supportive schematics illustrate the text. ACD-ROM containing Mathcad worksheets and a PDF file of the book is included.

\$49.95 plus \$5 shipping from LLH Technology Publishing, 3578 Old Rail Road, Eagle Rock, VA 24085; phone (540) 567-2000, fax (540) 567-2539, or visit <http://www.llh-publishing.com> on their web site

HAMCALC 48

"Aversion to mathematics is not an acquired distaste — it comes naturally," reads the motto on the menu. Now in its 48th version since the disk was first offered in 1993, HAMCALC is a compilation by Canadian amateur George Murphy, VE3ERP, of around 250 "Painless Math and Design Programs for Radio Amateurs and Professionals." It contains so many programs that the disk is now a CD. HAMCALC requires a WINDOWS operating system, and Murphy recommends the program be installed on your hard drive for best operation.

Contents and programs are organized alphabetically into six sections: 555 Timer to Code; Coil to Impedance; Inductance to Potentiometers; Power to Stubs; Sunrise to Yagi; and Yagi to Zepp. An index provides a helpful cross-reference if you can't find the tool you're looking for.

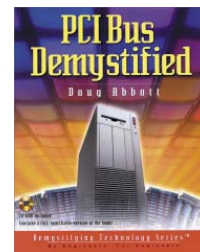
For learning or designing radio projects this CD-ROM makes a wonderful reference tool, and best of all, it's available for the cost of shipping and materials. Send US\$7 check or money order to George Murphy VE3ERG, 77 Mackenzie Street, Orillia ON L3V 6A6, Canada (e-mail ve3erp@encode.com)

PCI Bus Demystified

by Doug Abbott

Computer hardware and software designers will appreciate this update on peripheral component interconnect (PCI), the dominant data exchange mechanism for modern computer systems. With high resolution graphics, wide-bandwidth video and networking, the last two decades have seen enormous changes in data handling requirements. Chapters discuss how multiple masters share the bus, data transfer protocols, advanced and optional PCI features, plug and play, error detection and reporting, PCI bridging to increase capacity, PCI BIOS, and the new Compact PCI. Extensive charts and tables are provided to make the system designer's task easier, and a PDF CD-ROM of the book is included.

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Keaau, Hawaii

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- Don Nauer

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By Bob Grove,
Publisher

Dialogue on Out-of-Band Broadcasting

A Letter from Stanley Leinwoll:

Reference is made to your November 2000 *Closing Comments* observations in *MT*. Although the first part of your editorial is factual and appears to be trying to making a straightforward case, the second half, an assault on private U.S. shortwave broadcasters and their frequency management practices, is unfounded and, I am afraid, based on misconceptions as well as erroneous assumptions.

Let me first assure you that private U.S. broadcasters operate strictly within the Radio Regulations of the International Telecommunication Union, [ITU], as well as the FCC's Rules and Regulations. Although U.S. broadcasters "seem [to you] to move about the spectrum at random," nothing could be further from the truth. U.S. broadcasters operate in accordance with authorizations which the FCC provides in writing... Furthermore, out-of-band operation strictly follows ITU Regulations, and is sanctioned by the FCC on a non-interference basis.

The relevant Radio Regulation permits the use of any frequency in any band for virtually any purpose provided "*they avoid causing harmful interference to services rendered by stations using frequencies assigned in accordance with the table of frequency allocations.*" U.S. broadcasters use out-of-band frequencies ONLY after they have been authorized by the FCC. Such prior authorizations are given after detailed scrutiny, with the expectation that they will not cause harmful interference. A classified list of U. S. government frequency use is carefully reviewed, in order to avoid conflicting assignments.

On a world-wide basis, a study of any recent HFCC coordinated schedule will indicate to you that approximately 25% of the more than 25,000 daily shortwave broadcasting frequency hours are out-of-band.

Increasing congestion and interference is not an excuse for such use – it is the reason it occurs. Furthermore, the advent of satellite and other sophisticated methods of communication have resulted in a mass exodus of Fixed [point-to-point, mobile, etc.] users from the bands allocated to these services, leaving significant portions of the HF bands underused. The movement of shortwave broadcasters into these bands represents an efficient and effective way of utilizing a scarce and finite natural resource.

As a point of information, the HFCC has significantly expanded its base. It now includes the Arab States Broadcasting Union [ASBU], and a recent meeting in Kuala Lumpur also included the Asian Broadcasting Union. [ABU]. Approximately 90% of the world's HF broadcasting was coordinated at the KL meeting.

I will remind you that a number of HF broadcasters, including Russia's Radio Rossii, continue to operate domestic services openly in the bands above 6 MHz. Although your piece started promisingly, it quickly digressed into an apparent effort to stir up a controversy, where, in fact, none is warranted.

A Response from Rachel Baughn, editor

Thank you, Stan, for writing to state the situation from the perspective of a person involved in frequency coordination for many years. (For the benefit of our readers, we note that Stanley Leinwoll attends HFCC conferences on behalf of his clients, WYFR and WEWN.) You are correct in detecting a critical tone to much of our editorial, though we did not at all intend to imply the broadcasters operate without approval or coordination. As "outsiders" to the process we had three primary questions:

1. When US and international regulations clearly prohibit most domestic shortwave broadcasting outside of the tropical zone, why is there no attempt to enforce this regulation?
2. How can the bands be crowded when alternative, proven bandwidth-reducing methods like SSB are available, propagation changes with the sun, shortwave broadcasters are dropping like flies as many are moving to satellites, and shortwave receiver selectivity is the best it's ever been?
3. Is there any other service (other than the government) that is allowed to operate out of band under the guidance of using "any frequency in any band for virtually any purpose?" Amateur radio, maritime, air, fixed point-to-point, and virtually every other utility service would quickly be taken to task if they did.

Our interest is especially aroused when the out-of-band frequencies that are commonly requested by "international" broadcasters are at the short-range, bottom end of the allocations, frequencies that are intended for domestic broadcasting. Wouldn't a higher fre-

quency propagate better to "Greenland" than WWCR's choice of 2390 kHz, a government/military allocation?

Jacques d'Avignon, *MT*'s Propagation columnist for years, had the same observation: "I fully agree with your comments, these broadcasts are specifically targeted to the US public! I did ask the National Shortwave Broadcasters Association to explain this phenomenon to me. My letter was never answered!"

"The tropical bands have specifically been set aside by the ITU mostly for NVIS propagation service in those area of the globe where the vegetation would play havoc with the normal broadcast frequencies due to the immense attenuation, and the programs more often than not are not relayed from other sites but produced to be delivered on these specific frequencies."

At the end of the November *Closing Comments* we asked if anyone cares about this issue. Since Mr. Leinwoll says we're stirring up a dispute where none exists, I guess he would say that no one does care. In one sense, we agree: we are neither for nor against the idea of domestic broadcasting. It's the inconsistency between international agreements, US regulations, and actual practice that is bothersome.

Mr. Leinwoll also made the following observation: "Incidentally, my contacts in the FCC know nothing about your alleged case of NASA interference which required NASA to move from 5810 kHz. ... In fact, 5810 kHz was, and continues to be, duly authorized by the FCC."

Perhaps the assignment was an oversight on the part of the FCC, but Bob Grove says it is not "alleged": "I personally listened to it happen and discussed it with a NASA, communications officer. As a utilities buff, I extensively monitored 5810 kHz USB, the heavily-used, registered, nighttime frequency for NASA launch support. The uninvited intrusion of WYFR on that frequency forced them to move to 5812 to avoid the interference caused to this worldwide network."

If readers would like to see an article on the process of HF frequency coordination, let us know your interest, and we will invite someone on the "inside" to explain the process more thoroughly. We certainly recognize that the field is complicated enough that many persons, including Mr. Leinwoll, have made it a lifelong career.

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